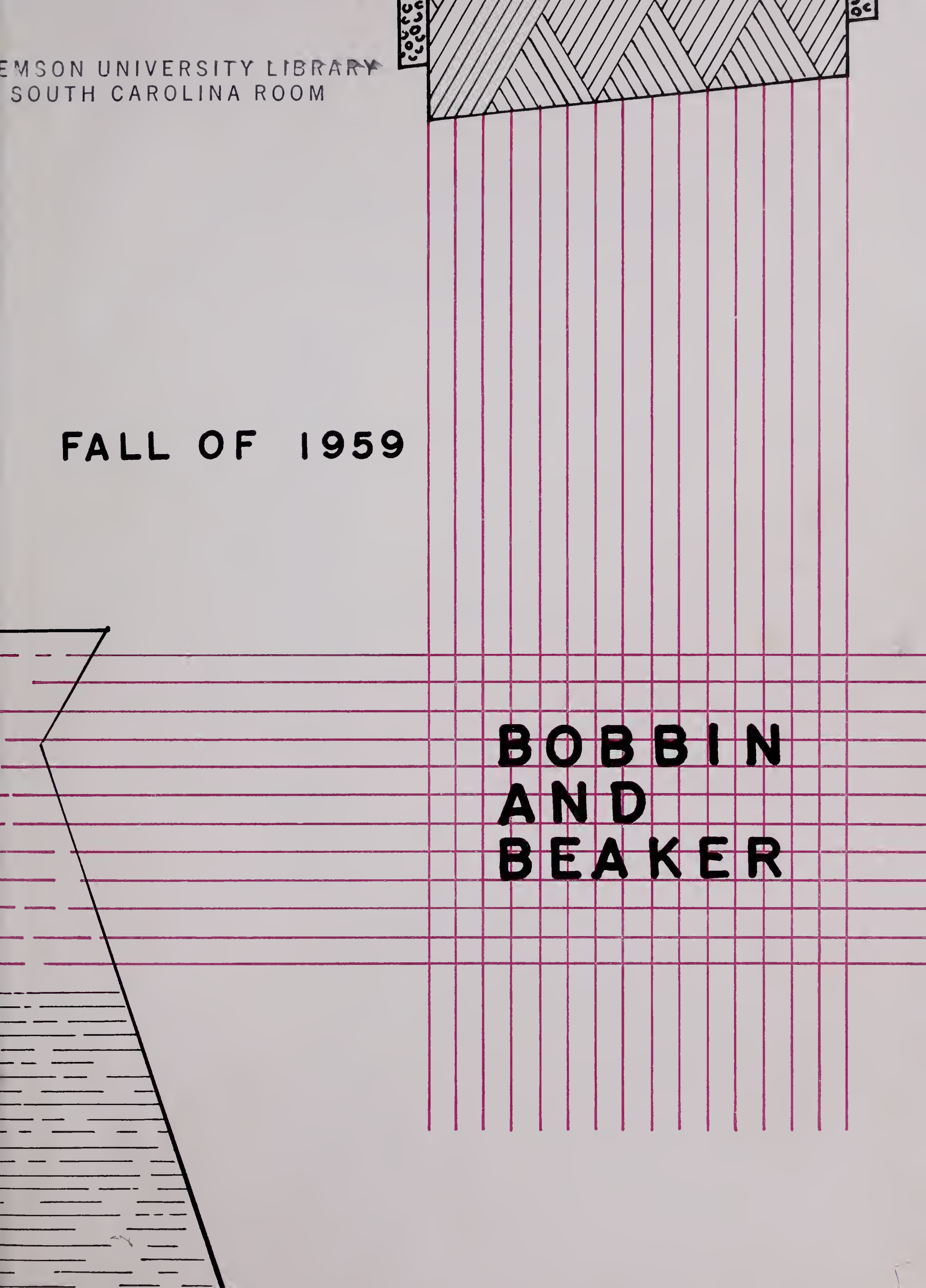
FALL OF 1959



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THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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from the Editor

This issue of the BOBBIN AND BEAKER is centered around an excellent article on the "Utilization of Radioisotopes in the Textile Industry." Also you will find articles dealing with research in other phases of textiles such as, textile humidification. Through these articles we hope to show you a few of the outstanding developments occuring in the textile industry.

A new column written by the Dean of the School of Textiles, Gaston Gage, is making its first appearance. We hope it will be of particular interest to Clemson Alumni.

—Alan Bell, Editor

The 1959-60 Bobbin and Beaker staff seated from left to right: Gordon Ferguson, Adv. Mgr.; Samuel H. Fleming, Circulation Mgr.; Charles Bagwell, Business Mgr.; Tommy Ariail, Managing Editor; standing, Alan Bell, Editor.

Utilization of Radioisotopes In The Textile Industry

W. T. Rainey, Jr.

Each year more and more industrial organizations are taking advantage of new research and production techniques which are the result of the atomic energy program. The United States Atomic Energy Commission is expending much of its effort in developing peaceful uses of atomic energy. Naturally, much of this effort is directed toward a cheap source of power. However, the uses of fission products and otherwise produced radioactive materials can seriously influence the economics of other industries. It has been very accurately estimated that the tobacco industry saved over 40 million dollars last year through use of the radioisotopes in production techniques. Such a saving could certainly help our textile industry. It would seem that the textile industry would be one of the first to take advantage of this new tool — radioisotopes. However, the textile industry has been somewhat hesitant to enter the field for several reasons. Some persons feel that the predominant reason is a backwardness of the industry in accepting new ideas. This may be true of some segments of the industry, but in view of the technological advances which have been made in the last few years, the industry as a whole cannot be considered backward.

Certainly, it is wise for any industry to survey the advantages and disadvantages of any new process or technique. But, let us carry out the necessary development work to properly evaluate the process, instead of immediately discarding it as either too expensive, no better, or psychologically poor.

The first step in using a new technique is an adequate general coverage research program. It is encouraging to see that such programs are being started at Raleigh, New Orleans, and other textile research laboratories. It is particularly encouraging to hear that certain industrial research groups are interested in initiating radioisotopes programs.

At the present time, radioisotopes applications in the textile industry are few. As far as I know there are no new production techniques in use involving radioisotopes in any textile industry. There are uses in associated industries; for instance, in preparation of papers and coated papers, and in preparation of plastic yard goods. Unfortunately, most of the work discussed in this paper will be work which has been done in research laboratories, not in production applications. However, it should be possible to visualize production usuage of some of the techniques developed by these research people.

Before we consider the uses of radioisotopes, it will be well to spend a few minutes reveiwing some of the fundamental information concerning radioactivity. First, perhaps we should define the word "radioisotope." A radioisotope may be defined, in one way, as an isotope which will undergo spontaneous nuclear reaction with liberation of energy in the form of radiation. You will remember from your freshman chemistry that isotopes are forms of an element having different atomic weights. We might consider oxygen as an example. There are two rather well-known isotopes of oxygen; oxygen of weight 16 and oxygen of weight 18. Neither of these isotopes is radioactive. They are different only in mass. Perhaps I should mention that even though isotopes are not radioactive, it is possible to use these materials in chemical research since they can be identified by means of mass spectrograph techniques. Tables I and II list a few of the radioactive isotopes of some of the more common elements.

The total number of stable isotopes of all known elements so far identified is approximately 275, and the number available in concentrated, or usable form, is approximately 190. However, the number of identified radioactive isotopes is around 900. This number is undoubtedly increasing as time goes on. There

are approximately 150 available radioactive isotopes which can be used in research.

It would be wise for us to review several properties of radioisotopes that are rather important to us in utilization of these materials. First, we should realize and remember that the decomposition or decay of radioisotopes is controlled only by the laws of probability. So far chemical and physical treatments have been unable to affect the rate of decay. This decay of rodioisotopes is an exponential function, and the rate of decay is dependent only on the number of atoms present. The rate of decay of a radioisotope is often expressed by means of the term called "half-life". One half-life is the period of time required for decay of one-half of the original radioactive atoms present. Thus, at the end of one half-life, only one-half of the material remains. At the end of two half-lives, only 25% of the material remain. At the end of three half-lives, 12.5%, etc. Often we hear that at the end of 10 half-lives, we can consider practically all of the radioactive material to have decayed.

A second property to be considered is that of the radiation of these radioisotopes. We should remember that the radiation liberated during decay of the elements may vary, both in type and in energy. The three types of radiation with which we are most familiar are the alpha, beta, and gamma radiations. Alpha radiation is made up of helium nuclei. These particles are relatively heavy and are highly ionizing. However, being fairly large particles, they are weakly penetrating. Beta (—) radiation consists of electrons and is therefore weaker in ionizing power than alpha radiation, but more penetrating. Gamma radiation is a form of electromagnetic radiation which is very weak in ionizing power, but very penetrating, and may be considered similar to X-rays. As an example of the penetrating power of these forms of radiation, we might considere alpha, beta, and gamma radiation of one million electron-volt energy. Alpha radiation of this energy is stopped by ordinary paper. Beta radiation of 1Mev energy can be stopped completely by 1.5 millimeters of concrete or 0.6 millimeters of iron. Gamma radiation, on the other hand, is only 25% absorbed by the same amount of iron.

The third property we should consider is the fact that radioisotopes are chemically the same as the stable isotopes. Their chemical reactions and their physical effects are almost always exactly the same as those of stable isotopes of the same elements. In a few cases, so-called "isotope effects" are noticed. But for tracer techniques and most other applications of importance to us, these isotope effects can be neglected.

(Continued on page 16)

KNITTING ELEMENTS FOR BEARDED NEEDLE WARP KNITTING MACHINES

There is hardly a branch of the knitting industry that has seen a more rapid development of machine speeds than the warp knitting trade. The number of courses per minute on bearded needle warp knitting machines has more than doubled during the eight years since 1950. Yet there is no indication that speeds of 1,000 and 1,200 courses constitute an absolute maximum. In fact, several articles have been published by prominent warp knitting technologists throughout the world envisaging speeds of 2,000 or even 3,000 courses per minute.

In view of the revolutionary changes that have been effected to the drive mechanismn, the let-off and take-up mechanisms and other motions of the warp knitting machine in an effort to obtain increased speeds, it seems surprising that little or no changes have been made in the basic design of the knitting elements themselves, that is, the spring beard needles, guides, and sinkers.

The question of whether the bearded needle, for example, will or will not be capable of operating in machines running 3,000 courses per minute goes beyond the scope of this article. It will be clear, however, that even with present speeds the standards of production, inspection, and alignment of the basic knitting elements must be proportionately higher than only a few years ago. At 1,000 courses, even minor deficiences in the quality of the elements or in the accuracy of their alignment becomes immediately critical. The result is machine downtime and an excessive fault rate which in extreme cases may offset the gain in production achieved through a higher speed.

Textile Machine Works of Reading, Pennsylvania, were among the first to recognize the need for stricter quality and precision standards in warp knitting machine cast elements. Many years of close association with the warp knitting industry, invaluable experience in both machine building and needle manufacturing, and advanced methods in the production of the knitting elements are the three cornerstones of the warp knitting service that Textile Machine Works now offers to the industry.

In the light of what was said at the beginning of this article, it is believed that the new methods and techniques in the production and inspection of warp machine cast elements are of general interest to the trade and to the student of the industry, and they will therefore be discussed under the following heads.

NEEDLES

Although naturally there exists an intimate association between the dimensions of the needle and the needle bar and other loop-forming motions inherent in the design of a machine, the adaptability of warp knitting machines to use different sizes of needles is probably greater than is commonly realized. The most critical dimension is the beard length, which, in case of a change in needles, must be kept fairly constant. Variations in stem pressing, stem height and overall length may on the other hand be relatively great. However, it will be understood that this might require changes to the trickways in the mold for proper spacing and fitting of the new needle. Precision in needles means precision manufacture insuring a complete dimensional uniformity of all needles being used at a time in a particular machine—a property which, together with other factors, is essential for best knitting results. But it does not mean that only a specific needle could be used in a specific machine type or for a specific gauge.

The advantage of the possibility of adopting one type of needle in different warp knitting machines can be seen readily. It amounts to the fact that many warp knitting mills, particularly those that operate a variety of machine makes and types, can to a certain degree standardize their needles. This facilitates the all-important task of keeping the principal knitting elements in first-class condition and directly or indirectly leads to lower costs.

CASTING AND FINISHING

The point has been made that the needles themselves are quite versatile as to the type and gauge of machine in which they can be used. But what about the casting?

Again the basic requirement is obviously dimensional uniformity of the casting and accuracy of alignment and spacing of the needles. These two factors, the significance of which cannot be sufficiently underlined, are vital for ease of replacement and accurate control of gauge of the cast units. How can they be insured? The answer is that they are to a very large degree governed by the condition of the casting mold and the finishing or sizing of the units subsequents to casting.

Standard practice in the past has been for the machine builder to supply a casting mold along with every machine in order that the right type of unit should be used in each. Many mills are, in fact, still operating on the basis of one mold for every one, two, or three machines, which involves the keeping of careful records and increases the danger of replacement shortage caused by a damaged mold. This method can be further improved by standardization of the cast units, using one type of unit in any number of like machines. The unit is cast from one mold which, depending on the equipment being operated in a particular mill, may cover all or a large part of the machines. It is obvious that this method cuts inventories and in many ways helps to achieve savings in money and time.

The standardization of cast units by having one or two molds only to serve the entire mill is definitely not a case of 'putting all one's eggs in one basket'. It is of great assistance in maintaining uniform dimensions and correct alignment. It is recommended that the mold, or molds, be entrusted to the supplier of cast units, who then assumes the responsibility for their condition. The mold will in all cases be retained exclusively for the owner. Periodic reconditioning of molds, particularly of the trickways that receive the needles, or guides, is a necessity because worn or damaged slots will twist the needles, making it impossible to cast a satisfactory unit. Of course this is a job that requires not only some experience in the casting of warp knitting units but also the services of a skilled tool maker, who is not normally available at a knitting mill.

Such an arrangement offers numerous advantages to the warp knitting mill. The mill would not have to order the loose parts, alloys, and other accessories for casting from various suppliers; it would not have to maintain the personnel and floor space necessary to cast and straighten elements; nor accept loss and damage of loose parts through storing, handling, casting, and straightening. On the other hand, it would be assured continuity of quality and supply.

In order to determine when a mold is in need of reconditioning and as an initial safeguard against variations in dimension and alignment, two master samples are established for needle units. The first is a master unit for casting purposes which has been approved by the customer for snug fit and easy replacement in the needle bars of his machines. Comparisons between the current production and the master unit are made several times daily with the help of precision gauges such as shown in Figure 1. The picture illustrates the gauging of the length of a needle unit from the front locating edge to the needle head. A tolerance of + or — .001" is maintained. To guarantee the proper width of the units, the castings should be slightly oversize, which provides for a certain dimensional tolerance.

The excess material is then removed by a process called sizing. The term is actually self-explanatory, but it must be understood that this operation requires a maximum of precision to insure the complete inter-changeability of the leaded units. Machine methods, allowing for close adjustments, should therefore be applied in preference to hand filing. After sizing, 3" of leads are gauged with the usual snap gauge to see if any excess in the widths of the units is building up. If, on the other hand, a casting is undersize, there is nothing that can be done to bring it up to the right dimension.

The second unit is a master for alignment purposes. Figure 2 shows the checking of a set of units against the master liner which assures perfect alignment of all units. The master lines are not used for straightening purposes, since the needles can be incorrectly aligned while being mathematically straight. All the same, straightness is an important requirement, since the exact adjustment and trouble-free operation of a machine depends on a straight parallelism of all knitting elements.

Coming back to the mold again, it has been already pointed out that the tricks in the mold can be altered to hold needles of different pressing and height from the original needle. There is a fair amount of tolerance and, in fact, the length is sometimes more critical than the first two dimensions. The length must be sufficient to guarantee a firm seat in the lead, while beyond a certain limit an excessive length of

needle stem may obstruct the flow of lead and result in an inferior casting. Otherwise the trickways can even be replaced by interchangeable button inserts, which allows two types of needles to be cast in one mold.

The casting operations themselves will probably be familiary, but even so, too much importance cannot be placed on such basic essentials as the correct casting temperature of the alloy and the pre-heating and smoking of the mold. The pouring of the metal in such a manner as to produce a well filled out casting (it is especially important that the center tricks are filled out) is largely a matter of the caster's skill and shows that this work should also be done by trained personnel.

GUIDES

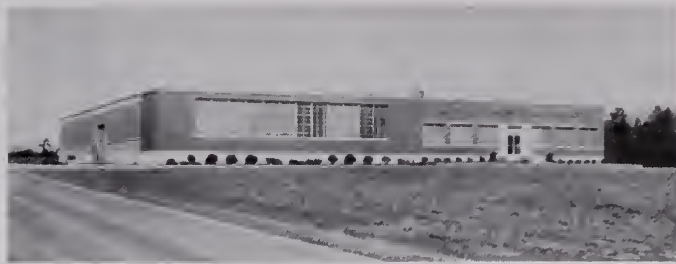
Most of what has been mentioned in the foregoing applies also to the thread guides, although, for example, there is no necessity to establish a separate master casting sample. Correct dimensions and alignment are again controlled by comparators. Figure 3 shows the checking of the length from the locating edge to the bottom edge of the guide blade. The straightness only of the guides, that is, their correct mating, is checked by comparison with the master unit.

The chrome plating of guides is too specialized a subject to be dealt with in detail in this article, but it might be mentioned that an inspection of the chrome plating, which is best made under a microscope after casting with the guides nicely spaced and held in the lead, should reveal a dense, uniform, homogeneous coating free from all porousness, pits, blisters, cracks, strain lines or build-up of chrome around the edges. Any of these defects make the unit unacceptable.

The reconditioning of molds for guides, while equally important, is technically simpler because the slotted inserts in most guide molds are replaceable in any case. Therefore, guide molds can be easily made to accommodate various types of guides, subject to the qualifications that have previously been made for the overall dimension.

CONCLUSION

The productivity of a warp knitting machine for a given fabric quality depends on the speed. Which speed? The mean cruising speed, obviously, and not on this alone but also on the down time, both avoidable and unavoidable. There is no question but that the condition of the knitting elements, which are the heart of each knitting machine, is a crucial factor in both.



AMCO

And The Growth of Textile Humidification

The need for close control of relative humidity and temperature, now recognized as essential for maximum efficiency and high quality of product, was not apparent until textile plants were built where the benefits of the natural damp climate similar to that of Lancoshire, England, were lacking. The first textile plant in America was built near the sea coast and beside a waterfall whose misty spray helped maintain a high relative humidity. Other textile plants were erected along Canadian and United States coast lines by British pioneers looking for similar climatic conditions to those of England.

The need for artificial humidification became apparent when machine carding, spinning and weaving also developed in Germany, France and Switzerland. In 1888 humidifying devices invented and patented in Germany were offered in the United States by the First "Ancestor" of American Moistening Company, in Boston, and research and development started toward the improvement of industrial humidification in America.

Speed of operating textile machinery and consequent heat generation, was low as compared with modern practice but the low relative indoor humidity conditions prevailing in winter caused many mill operators to liberate exhaust steam to raise the relative humidity and so improve quality and production. These steam pots were used extensively, particularly in cotton weave rooms where the tensile strength of warp deteriorated with low regain. When a warp end broke, the loom had to be stopped immediately to prevent a defect in the cloth. When stop motions came into use, quality was improved at the cost of considerable loss in production. A humidifying device which humidified without adding heat, was therefore a big step ahead.

The earliest humidifiers were crude by comparison with the equipment available today. Water was pumped through an impingement type nozzle producing a cone of spray within a cylindrical metal housing. The downward draft of air induced by the cone of spray carried a small percentage of the spray into the room atmosphere. The remaining water was collected in a pan underneath the metal housing surrounding the nozzle, and returned to a tank in the basement from where it was recirculated through the humidifier again. These humidifiers in groups comprising a system were operated manually, that is, they were started and stopped by hand. Approximately 7% of the water pumped through the humidifiers came out as useful water vapor.

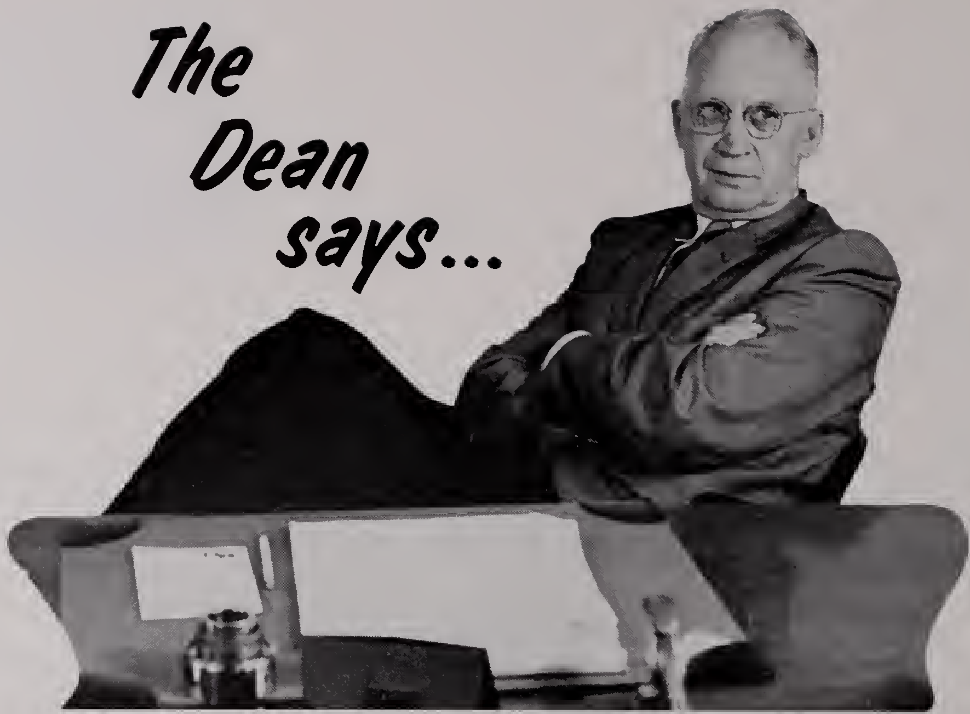
Water pressure type humidifiers were limited to reasonably high ceiling rooms, generally free from overhead obstructions such as shafting and belting. To accommodate low ceiling rooms, and to avoid blowing free moisture over card clothing, low capacity, compressed air actuated atomizers were developed as the proper solution to these problems.

In the beginning these atomizers were equipped with manually operated cleaning pins which in later models were designed to function automatically at every stop and start action. The atomizer has continued to grow in popularity because of mechanical simplicity, low maintenance requirements and flexibility in system design. It is the most efficient and economical tool for direct humidification in use by the trade today.

The atomizer performs the function of adding the necessary water vapor to raise the relative humidity to the desired point and as well, reduce the dry bulb temperature of the room in proportion to the amount

(Continued on page 23)

The Dean says...



I propose to run this column each issue. It will consist of news, plans, hopes and requests. The School of Textiles wants to serve the textile industry of South Carolina and the southeast.

* * * * * *

The more important function of the School of Textiles is to educate young men and women. In our case it is to educate them for a career in the field of textiles and for a successful life. As you in the manufacturing business know, raw material is of the utmost importance in turning out a top quality product. The same is true in the field of education. We cannot buy our raw material. It must have chosen a career in textiles. Not enough young people are making this choice.

* * * * * *

Last summer we ran five very successful three-weeks short courses in Yarn Manufacturing, Fabric Development, Supervisor Development, Quality Control and Methods and Standards. We intend to offer the same program in the summer of 1960. I would be glad to give anyone details. Last summer's program was a complete success.

* * * * * *

You will be pleased to know that statistics and quality control are now required in all three of our curriculums. They are taught by Professor LaRoche. He attended a six-weeks seminar last summer in this field on a National Science Foundation Fellowship.

* * * * * *

Professor Richardson has completed all his work for a Master's degree. His major field is Methods and Standards.

Professor Marvin has completed everything but his thesis for his Master's degree in Yarn Manufacturing.

* * * * * *

The South Carolina Textile Manufacturers Association is sending **The Southern Textile News** to all members of the Junior and Senior classes. This was proposed by Fred Dent, President of the Association and President of Mayfair Mills.

* * * * * *

We have a most attractive student lounge. The Sirrine Foundation paid for furnishing and decorating the old Phi Psi room. The Phi Psi fraternity still uses it but it is also used as a lounge. Drop by and see it when here for a football game.

* * * * * *

There have been many inquiries from the industry for young men; more in the last two months than I have ever known.

* * * * * *

We have air conditioned another testing laboratory so that the teaching facilities are not nearly so crowded. We have the old lab for research. There has long been a problem of teaching and research conflicting in the one small laboratory.

* * * * * *

You probably saw in the daily papers that Professor Campbell had been made head of the Textile Management Department. Since 1946 this department had been under the Dean. Professor Campbell should serve us well.

Outstanding Seniors . . .

By
Benny R. Phillips

Gene G Floyd is a married student 23 years old is presently living in Clemson. Gene transferred from P. C. to Clemson in 1958 to major in Textile Science. Gene has made honor grades since he has been at Clemson.

At the present Gene is serving as a member of S.A.M. and Phi Psi. Gene has also won the $100 kint contest offered by "Textile Industries."

In the line of textile experience Gene has had a great deal. He worked for five and one-half years continuously at Joanna Mills.

Through his work and the help of his wife Gene has paid his entire expenses through his first three years of college. Gene won a $500.00 Chemstrand Scholarship this year to help him with his expenses.

Samuel H. Fleming hails from Ora, South Carolina and is a Senior majoring in Textile Manufacturing.

Sam is very active in campus organizations and has held class offices. Sam is a member of the N.T.M.S., Phi Psi, P.S.A., S.A.M., Y Council, and is circulation manager for the Bobbin and Beake." He has served as Soph-

omore and Junior representative and as a member of the Student Assembly. This year Sam is serving as a member of the Senior Council and as a Hall Counselor in the student dorms. We also find Sam serving as a Second Lieutenant in the Army R.O.T.C.

Guillermo L. Sanchez, known as "Bill" to the men on campus, is one of the foreign students in the Textile School. Bill comes from Havanna, Cuba and is majoring in Textile Manufacturing.

Bill is very active on the Clemson campus and is a member of Phi Psi and has been a member of N. T. M. S., both textile societies. He is serving on the Y Council and has been a member of the Y cabinet. Bill is also a member of the International Student Association of which he as President last year.

Bill's textile experience came from working in a textile plant in Havana. Bill has worked with Fabrica Textilera Antex S. A. during the summers while at Clemson.

Bill has made honor grades five out of six semesters completed at Clemson.

UTILIZATION OF RADIOISOTOPES IN THE TEXTILE INDUSTRY

(Continued from page 8)

When we speak of activity of a radioisotope, we are expressing something about the rate of disintegration of the atoms of that material. The basic unit of activity is the "curie". A curie is the weight of a material yielding 3.7×10^{10} disintegrations per second. Formerly the term "curie" was based on one gram of radium, a curie of a material being that weight which exhibited the same number of disintegrations per second as one gram of radium. However, the curie is a rather large unit of activity for most purposes, and terms such as the millicurie, one-thousanth of a curie, and the microcurie, one-millionth of a curie, are much more important in ordinary applications. However, these terms — curie, millicurie, and microcurie — are merely indicative of the total amount of activity present, no matter what weight of material is involved. Therefore, for most applications, we are more interested in the term "specific activity". The specific activity is the activity per unit weight of material, and for most tracer work and reaction mechanism work we might be interested in, specific activities of the order of millicures or, sometimes, microcuries per mole are common.

It might be of interest to point out some of the means of detecting or measuring the activity of radioisotopes. One popular method for measuring activities is the use of an ionization chamber. This is particularly useful in organic chemical work requiring measurement of carbon-14 activity, as carbon dioxide. Carbon-14 decays into a beta (—) particle (an electron) and a nitrogen-14 ion. If this decay of carbon-14 takes place in an ionization chamber, some of the particles of gas in the chamber will be ionized and the chamber will therefore allow conduction of an electric current. If a high voltage is applied across the ionization chamber and a very sensitive current indicating meter is employed, the relative amount of carbon-14 in the chamber can be determined by the measure of current passing through the chamber. In using this technique for measuring activity of carbon-14, the organic material containing the radioactive carbon is burned, or in some way oxidized to carbon dioxide, which is run into the chamber. This chamber is placed on the counter and the amount of carbon-14 present determined by comparison with a chamber containing a known amount of carbon-14 dioxide.

Another method used quite often in measurement and detection of radioactivity is the scintillation counter. Scintillation counters depend for their action on crystals of materials which liberate visible light when bombarded by radiation. If a radioactive material is placed in a scintillation counter, the radiation causes bursts of light in the scintillator crystal. These bursts of light are picked up by a photomultiplier tube and indicated by a meter. The meter would indicate the relative number of light bursts and, therefore, the relative number of radioactive disintegrations taking place.

Another method quite often used is a photographic technique, in which the material containing a radioactive isotope is placed against a photographic plate. After exposure for a period of time, the plate is developed and the darkness of the image is a measure of the amount of radioactivity present. This method is important because it is extremely sensitive and will determine the exact position of the radioactive portions of a sample.

IMPORTANT RADIOISOTOPES EMITTING PURE BETA RAYS

ISOTOPE	HALF-LIFE	ENERGY OF RADIATION
H^3	12.5 YRS.	0.019 Mev
C^{14}	5700 YRS.	0.155
P^{32}	14.3 DAYS	1.712
S^{35}	87.1 DAYS	0.166
Ca^{45}	164 DAYS	0.25
Sr^{90}	28 YRS.	2.24, 0.54
Tl^{204}	4.0 YRS.	0.77

USAEC-ID 350A

TABLE I

Table I shows the most important radioisotopes which are pure beta emitters. Of this group, I would like to point out several since they are rather important in research and perhaps in production techniques. Carbon-14 has a rather low energy (0.155 million elctron volts) and has a relative long half-life (approximately 5700 years). Phosphorus-32, on the other hand, has a more powerful radiation, but a much shorter half-life. Therefore, for some purposes, phosphorus would be much better to use than carbon in radioactive tracer work. If, for instance, we require that a piece of equipment be contaminated with a radioisotope during a test, it would be much better to use phosphorus-32 than carbon-14. If our equipment did become contaminated with phosphorus, it would merely be necessary to isolate the equipment for a period of several months in order to have all the phosphorus decay. Sulfur-35 is another relatively important isotope. Notice again, as with carbon-14, this is relatively low energy beta emitter, but has relatively short half-life. Strontium-90 is an isotope which is certainly in the news a good bit of the time.

This is a material which is particularly detrimental to humans and animals because of absorption and concentration in the bones. However, this strontium-90 isotope is important to us in some of our applications of radioisotopes in industry. Beta gages quite often use strontium-90 as a source of radioactivity.

Table II shows certain other isotopes which could be of importance to us in our research work. These isotopes all decay by liberation of both beta and gamma rays. Perhaps I should point out the iron isotope which has been publicized in petroleum research as "hot" or radioactive piston rings. Cobalt-60 is being used quite a bit in sources of radiation for X-ray techniques and for irradiation of materials under study. Iodine-131 is useful as a medicinal radioisotope in the treatment and detection of thyroid troubles. Gold-198 has also been used as a radioisotope for medicinal treatment of cancer.

IMPORTANT RADIOISOTOPES EMITTING BETA AND GAMMA RAYS

ISOTOPE	HALF-LIFE	PROMINENT RADIATIONS BETA	GAMMA
Na^{24}	14.9 H	1.39 Mev	2.76, 1.38 Mev
Fe^{55}	2.91 Y	NONE	0.006
Fe^{59}	46.3 D	0.46, 0.27	1.10, 1.29
Co^{60}	5.2 Y	0.32	1.33, 1.17
I^{131}	8.05 D	0.61, 0.34	0.36, 0.64
Cs^{137}	33 Y	0.52, 1.18	0.66
Tm^{170}	127 D	0.97, 0.88	0.08, 0.05
Ir^{192}	74.5 D	0.67, 0.54	0.32, 0.31
Au^{198}	2.69 D	0.97	0.411

TABLE II USAEC-ID 351A

In our discussion of isotopes I would like to divide the uses into two broad groups. First I would like to consider uses of isotopes in which the isotopes is used merely as a source of radiation, that radiation being used in causing some effect on a material. Next, I would like to consider uses of radioisotopes in which the radioisotope is used as a tracer or enables us to trace an article, fiber, solution, or molecule in some process.

Certainly one industrial use of radioisotopes as sources of radiation is in the radiography of metallic materials. Radiography of welds, casting, etc. in ship building, nuclear reactor construction, and other industries is an important field. However, for our purpose, we shall omit radiography.

Next, we might consider the use of radioisotopes as sources of radiation for irradiation of materials. There are many uses of irrodiation techniques in industry today. Food irradiation is one about which we hear quite a bit. However, for the textile industry, we would be most interested in the fiber studies. Work at New Orleans and at Raleigh on irradiation of cotton with gamma rays, beta rays, neutrons, and other types of radiation, has been reported in the literature **(1, 2, 4, 5)**. Most of the work indicated that cotton is decomposed in some way by radiation. Radiation seems to cause carbonyl formation, carboxylic acid formation, and chain cleavage. After irradiation there is increased solubility in water and alkali, increased base exchange properties, decreased tensile strength, rather unusual changes in moisture regain, but no great change in infra-red spectra. Most of the workers who have studied the effect of radiation on cotton seem to agree fairly well that these are the major effects. It is of interest to note that no particular improvement has been noted in properties of cotton. Most of the effects have been to the disadvantage of the textile industry. There does seem to be conflicting evidence as to the effect of the rate of radiation. Most of the workers do agree that different types of radiation seem to cause approximately the same general effect, and the latest information seems to indicate that the total dose of radiation is the important factor, not the rate of radiation.

In one study **(3)** on stability of acetate, rayon, and cotton, the general effects seem to be: decrease in size of molecule, decrease in modulus, decrease in tenacity, and decrease in elongation. Acetate proved to be the most resistant material and cotton the least.

Some rather interesting work has been reported on the wool fiber **(6, 7, 9, 10)**. Wool seems to be fairly resistant to radiation at low levels of radiation. Therefore, radiation has been suggested as a means of sterilizing wool, of catalyzing its reactions, and of eliminating static in processing wool. However, at higher levels, wool is decomposed. Its alkali solubility increases, its cystine content is decreased, its acid combining capacity is decreased, and, finally, wool loses its fibrous character. It might be expected that radiation could cause additional cross-linking of wool molecules. However, one researcher reports that no additional cross-links are to be found **(10)**.

A tremendous number of reports **(11, 12, 13, 14)** are available giving results of radiation studies on plastic materials. In general, it seems that synthetic fibers loose tenacity, elongation, and flex life. One study **(14)** showed that, in the nylon, orlon, dacron, acetate group, dacron seems to be the most resistant to radi ation. Polystyrene **(15)** reported to loose elongation and inpact strength, but to gain in tensile and modulus. Polyethylene **(15)** increases in high temperature stability and is being marketed after irradiation at the present time.

Another use of the radioisotopes as a source of radiation is in the field of catalysis. There are fairly good reports on catalysis of a few reactions. One of

the most important of these reactions to the textile industry is the polymerization reaction. It has been said that radiation is a difficult way to do an easy job in polymerization reactions, but it should be pointed out that radiation catalysis may lead to products different from chemical polymerization. Reports on graft polymerization are of particular interest (**15, 16**). Graft polymerization is a reaction between the polymer molecule and a monomer to attach side chains or cross-links. By vary ingproportions of monomer and polymer the properties of the product can be varied. One report (**15**) indicates that up to 20 % acrylate has been grafted onto cellulose by radiation-catalyzed graft polymerization. Also it indicates that some success has been achieved in grafting teflon onto cellulose molecules. However, I have been unable to find definite proof of the last statement.

Another use which may be of value to the textile industry is the use of radiation for elimination of static (**17**). This has been used in the past and may be even more important in the future, particularly in the synthetic textile industry. In the past, commercial static eliminators used radium as a source of radiation. Now, various fission products have been proposed as useful sources of radiation and are much more economical and safer sources than radium. Alpha radiation emitters are the strongest ionizers, but, remembering that they are poor in penetration, they are difficult to encapsulate for protection from contamination. A capsule or covering placed over an alpha emitter will greatly reduce the amount of radiation available. Therefore, beta emitters, which are fairly strong ionizers and fairly good penetrators, are useful. Strontium-90 is one of these which has been used as a static eliminator.

Static eliminators are possible because of the ionizing ability of this radiation. The radiation causes ionization of the air around the static eliminator, and electrical charges, which are present either on the machinery or on the cloth, are able to leak through the air to ground.

Another very important application of radioisotopes as sources of radiation is in measurement of density or thickness of materials (**18, 19**). This probably could be the first successful commercial application of isotopes in the textile industry, due to the high state of development of beta gages at the present time. The name "beta gage" has been applied to these gages because beta emitters are used as sources of radiation. These beta emitters have intermediate penetrating power and are more useful than alpha or gamma emitters. The gamma emitters are ruled out because of their tremendous penetrating power and alpha emitters are ruled out because they have no penetrating power. The isotope used in the beta gage depends upon the density of the material being measured. Krypton-85 is used if the density of the material is under 15 ounces per sq. yard. Cesium-137 is used for weights of 15-30 ounces per sq. yard, and strontium-90 is ordinarily used for higher densities. Consider the use of a beta gage in determining uniformity or thikness of a sheet of paper, plastic, or metal as shown in Figure 1. The radiation source may be placed below or above the sheet to be measured, and the counter is placed on the opposite side of the sheet. Since some radiation is absorbed by the sheet the amount of radiation detected by the counter and indicated by the meter is a measure of the thickness or density of the material between source and counter. It is possible to control the pressure on squeeze rolls or the amount of material applied to a sheet by means of feedback from the meter. This type of beta gage is used in several industries very closely related to the textile industry, and this device would be useful in padding applications in the textile industry.

In general, there are two types of beta gages available from industrial concerns today. The type just described is the absorption type beta gage in which the source is on one side of the material and the counter is on the other. Another type containing the source and detector on the same side of the material is called the back-scattering beta gage. In this case the radiation penetrates through the material and is reflected back to the counter by a plate which is called a backing plate. This type is used quite often in determining and controlling the thickness of a plated surface on a metal sheet. When using an absorption type beta gage, it is difficult to accurately determine small changes in the amount of plating on an iron sheet, for example. However, if the iron sheet is used as a reflector for the radiation, as in the back-scattering gage, then only the plating is actually being measured, and more accurate results are obtained. Ar far as the textile industry is concerned, the absorption type of beta gage may be the more valuable. The reports so far indicate that these gages should be useful in determining wet pick-up. It should be possible to control wet pick-up to within $\pm$ 5% with beta gages. This could mean good control in some processes, but in others, even 5% variation in wet pick-up can be rather bad.

Beta gage techniques have also been used in testing uniformity and weights in textile manufacturing processes. You may be familiar with the work of Ewald and Landstreet (**20**) at Knoxville in testing uniformity of yarns, slivers, and roving using a beta gage. They were able to devise electronic circuitry to give instantaneous uniformity as well as the mean and the variance.

One nice aspect of beta gages is that they lend themselves to process control. By feed-back techniques a padding operation can be rapidly and ac-

curately controlled to give almost perfectly uniform application of a product.

An illustration of the use of beta gage instrumentation in process control is the much publicized technique used in cigarette manufacture. In using these devices the absorption of radioactivity by a standard cigarette is compared with the absorption through the continuous cigarette rod being manufactured. If the absorption of radioactivity indicates that the density or amount of tobacco in the cigarette is low, then by feed-back the amount of tobacco being placed in the rod is increased. If the cigarette rod absorbs more radiation than the standard, then the feed-back to the tobacco control cuts down the tobacco. Most cigarette machines manufacture the continuous cigarette rod at the rate of about 275 feet per minute. Formerly, when operators were used to adjust the tobacco feed, it was often a minute or several minutes between checks on weight of cigarettes. Therefore, a fair amount of cigarette rod could be prepared either too light or too heavy before the tobacco feed control could be changed. However, in using the beta gage control, a correction can be made in the amount of tobacco in the time required to form only 17 inches of cigarette. Therefore, it has been possible for the cigarette industry to manufacture much more uniform products. In addition, they have been able to save considerably on the amount of tobacco used. Formerly, it was necessary to operate the tobacco feed to give a cigarette approximately 3% heavier than desired. This extra 3% allowed for the excursions in feed so that none of the cigarettes were below a desirable weight. However, with the "Accuray", it is possible to set the amount of tobacco exactly on the desirable amount and use no excess.

Our next group of applications are those in which a radioactive material is used as a means of tracing a molecule or a particle of material through some process. Ordinarily in tracer applications, the radioactive material is used in extremely small quantities, and ordinary laboratory care is sufficient for protection purposes. Many radioactive materials can be bought in the small quantities required without license from the AEC. Then, too, tracer techniques are usually more sensitive than ordinary analytical techniques.

A much publicized use of tracers in industry is the "hot piston ring" technique. By making a piston ring radioactive it is possible to check on the efficiency of lubrication or wear of the various metal parts rather easily. By running the engine only a short time with the radioactive piston ring it is possible to very accurately determine the amount of metal worn from the piston ring and from the cylinder walls. This technique is much quicker than the old method of running an engine until a weight change in a metal part could be detected. Then, too, it is much more accurate. This application of isotopes could perhaps be of interest to textile machine manufacturers, but not to textile manufacturers.

We would probably be more interested in work reported by several researchers in tracing movement of fibers during various mechanical operations.

An interesting piece of work has been reported by Taylor **(21)** from England on the movement of radioactive fibers during the drafting operation. Individual fibers were made radioactive by soaking them in a solution containing phosphorous-32 and these fibers were traced during drafting operations. He was able to determine that fibers were accelerated between the rollers in a drafting operation. This is something that has been impossible to determine by other techniques.

Interesting work in this field was reported by Watson **(22)**in studies of carding operations. Watson and his co-workers were able to follow individual fibers through the carding operation. They were careful to point out that large numbers of fibers must be studied for results to be statistically accurate. Altogether they traced 600 fibers through the carding operation, but thought this too small a number. One rather interesting observation showed that some fibers make from 60-200 revolutions on the cylinder before they are removed by the doffer.

This type operation has ben carried out by making fibers colored and tracing the colored fiber through the mechanical operation. However, it is much simpler to find a single radioactive fiber by means of a Geiger counter, than it is to find a single colored fiber by means of the eye.

Quite a large amount of work has been reported on the use of radioactive soils in studying efficiency of detergents, durability of finishing agents, and efficiency of washing machines, dry cleaning operations, etc. **(23, 24, 25).** Before the availability of radioisotopes, practically all the soiling determinations were made using some kind of light reflectance or whitness meter. One of the biggest problems in studying detergents or soiling operations has been in the selection of the type of soil. In the radioactive techniques, as in whiteness studies, one must be careful in selecting soils which are truly representative of naturally occurring soil. A very complete coverage of this topic has been given in the ASTM book entitled, "Symposium on Radioisotopes" **(26).**

In addition, manufacturers have made equipment available especially designed for this type study. They also furnish swatches which are soiled with radioactive soil. These swatches are counted before and after washing to determine the exact amount of soil removed. It is interesting to note the effect of making different components of the soil radioactive. The swatches contain a three component soil, any component of which can be made radioactive. Carbon black, glyceryl tristearate, and algal protein make up the soil. The studies have shown, as might be expected, that detergents vary in efficiency of removal of different types of soil. Quite a few other radioactive soils have been used by other investigators.

One of the first proposals for radioisotopes in the textile industry was made quite some time ago by Hampson in England **(27).** As shown in Figure 2, he proposed that by putting a radioisotope in one color box of a roll printing machine and a counter in the next color box it would be possible to detect immediately the migration of some of the first color into the second color. Many people who are familiar with the printing industry think that such a technique is unnecessary. They seem to feel that there is no need to worry about migration of color until it is visible to the eye. However, there may be possible applications for this kind of technique in the industry.

Another application of tracers might be that of determining and controlling the uniformity and amount of a product being applied to a textile material **(28, 29).** We considered this possible use in our discussion of beta gages, but in this case, we would actually put a radioactive material into the product to be applied to the cloth. By using the tracer in the solution we would be able to determine with a counter the exact amount of product applied to the cloth. It is possible to visualize many applications in the textile field for this type operation. However, as usual, we should consider whether this method is better than any existing method. One case of value reported in the literature **(30)** was the determination of uniformity and the actual amount of oil applied to nylon filament yarn.

One of the most valuable applications of radioisotopes in the field of chemistry has been the use of tracers in studying chemical reaction mechanisms, but many physical mechanisms have been studied also.

As examples of physical mechanisms we might consider absorption studies which have been made using textile fibers and radioisotopes. There are many reports in this field . Some excellent work is reported by Dr. White of the Textile Research Institute in studying absorption of various salts by fibers in dye baths **(31).** A particularly interesting and ingenious study showed rates of absorption of salts and dyes from a dye bath at the same time. This study was made using Anthraquinone Blue synthesized such that it contains sulfur-35, in a bath containing sodium-22 bromide-82 to determine rate of absorption of dye stuff, sodium ion, and bromide ion in the same process.

The fibers were removed from the bath after varying periods of time, their total activities were measured, and their activities were measured through a thin shield immediately and after standing several days. Measurement through the shield gave the total of sodium plus bromide. Subtraction of this activity from the total original activity gave the amount of sulfur-35 present. After decaying some time the relative amounts of sodium and bromide could be determined, since the bromide decayed rather rapidly. Therefore, it was possible in one treatment to determine the absorption of all three components.

Many more examples could be given of this type study. Dr. White also showed that absorption of simple salts from solution takes place by different mechanisms when dyestuff is present and when dyestuff is absent (32).

Another technique which could be of importance to the textile industry is a method of analytical determination called activation analysis (33). This method of analysis has been used in analyzing for only trace amounts of many elements. At this time it is possible for only a few laboratories to make their own activation analysis studies. However, there are commercial laboratories which will carry out these analyses. The biggest difficulty in performing activation analysis is the fact that a neutron source is necessary; with the increasing number of reactors and other neutron sources it should be easier and easier to have activation analyses made.

In this technique the samples under study are exposed to neutron bombardment until elements present in the same sample are converted into radioactive isotopes. By measuirng the activity, the decay rate, and the energy of radiation, elements present in the unknown sample can be identified. The sensitivity of this method depends a good bit upon the conditions of the analysis. Table III shows the sensitivity of this method of analysis as claimed by one of the commercial laboratories.

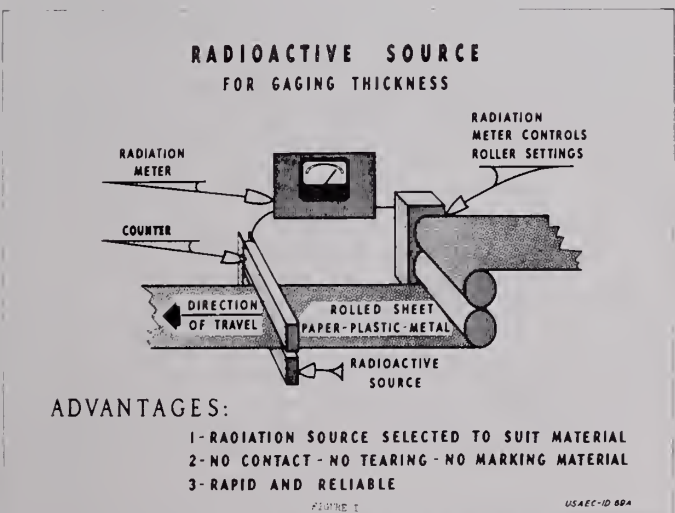


FIGURE I

Many uses can be visualized for a method of analysis as sensitive as this. It may be interesting to know more about the purity of water supply, or to know more about trace materials being eliminated in waste water. It should be possible to study the uniformity

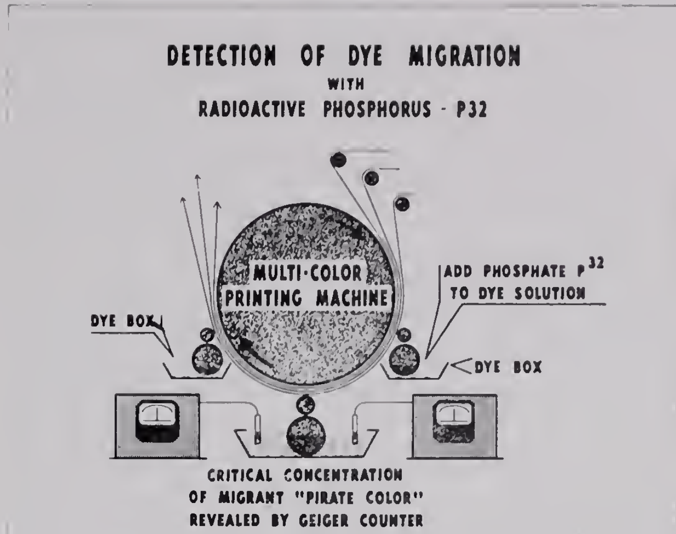


FIGURE II

and the exact amount of product being applied to cloth by means of activation analysis. For example, a small amount of zinc salt might be added to a solution being applied to cotton cloth. Then samples of this cotton cloth could be run through activation analysis to determine the amount of zinc present. In this way only trace amounts of zinc need be added and they should not interfere with the properties of the final product. Another rather important use of activation analysis could be in studying the role of catalysts in various chemical treatments applied to cloth. It may be that more uniform or better polymerization reactions could be carried out if we knew more about the effects of catalysts. One study reported on the role of the catalysts in polystyrene polymerization. The workers were able to determine that in using persulfate catalysts, a total of two sulfur atoms was involved in formation of each polystyrene molecule.

Table III

Practical Limit of Analysis

Element	Detectable Amount
Barium	0.4 micrograms
Copper	0.2
Phosphorus	0.003
Sodium	0.02
Sulfur	0.2
Zinc	0.05

Tracers may also be used in determining structure of rather complicated molecules. A rather interesting piece of work was reported on the study of structure of silk (**34**). Without going into the details involved in the chemistry, it was possible for the workers to determine that silk molecules contained more alanyl glycine groupings than glycyl alanine. Both of these were more abundant than glycyl glycine. The technique used in these studies was a modification of that known as "isotope dilution" and is most valuable for determination of compounds which cannot be quantitatively isolated.

This survey of the literature briefly covers most of the types of studies which have been made by research workers in the textile field. Not much has been done in this field. However, the future applications of radioisotopes in the research and in the production of the textile industry should be dependent only on the imagination of the workers involved.

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AMCO AND THE GROWTH OF TEXTILE HUMIDIFICATION

(Continued from page 13)

of water evaporated. In round figures the evaporation of one pound of water reduces the dry bulb temperature by absorbing approximately 1000 B.T.U. A well designed atomizer produces evaporation of 100% of the water discharged by it.

Deficiencies inherent in the pioneer humidifiers were that they were large, heavy and bulky, required water at pressures around 200 pounds per square inch and did not produce even distribution of the moisture added to the room air. Electric fans were added to them to promite wider distribution, but air velocities through the units had to be limited to prevent large drops of wated being ejected which would spot materials in process and wet down machinery.

Compressed air operated atomizers overcame these difficulties by disturbing small amounts of moisture at many points into the room air. This gave uniform distrbuton and made the moisture available where it is needed, down near the machines, which give off the heat that reduces the relative humidity and where the fibers are being processed. The bulk and weight of the early humidifiers required that they be mounted high overhead and depend upon inefficient natural convection for the distribution of moisture. They also had heavy power requirements to deliver water at high pressure for effective atomization.

Air pressure operated atomizers gradually replaced both steam pots and the early humidifiers, but their development was not without its engineering difficulties. They require compressed air which becomes contaminated with oil vapors when excess oil is used in the compressor. Excess vegetable and mineral matter in the water supply can also be a problem which may cause clogging of the small orifices necessary to their operation. Acceptance and wide use of atomizers followed the introduction by AMCO of the self-cleaning atomizer. In all AMCO has introduced seven models of atomizers over the years, each one in its turn incorporating improvements upon its predecessors for better mist quality, efficient compressed air use and simplicity of operation and maintenance.

Not only machine but worker efficiency is also affected by temperature and relative humidity conditions in mill workrooms. When the problem of efficient machine operation was solved by producing the needed relative humidities it was found that both temperature and relative humidity can be controlled for both machine efficiency and worker comfort and efficiency by the use of atomizers. Through the controlled introduction of outside air and increased evaporative capacity, it is possible in some processes to maintain the desired relative humidity within the work space and also reduce the indoor temperature to as low as seven degrees above the outside wet bulb temperature. This is accomplished by the use of fan operated and thermostatically controlled ventilating units which are placed in openings in the outer walls of the building.

The operating cycle for the removal of heat from machines, workers and sun heat proceeds as follows: moisture added to the air within the room absorbs the heat in evaporating the moisture and raises the relative humidity. Heated, humidified air is expelled through vents by the introduction of outside air mixed with the recirculated room air and moved by electric fans in the ventilating units. The proportion of fresh outside air mixed with the recirculated room air is controlled by a room thermostat located near the ventilating unit to maintain optimum processing and worker comfort temperatures. Automatic controls enable the ventilating units to deliver any mixture between 100% outside air and 100% recirculated room air. Placement of atomizers discharging directly into the flow of air from the ventilating units drops the temperature and raises the relative humidity of the fresh and re-circulated air before it reaches the machines and textiles in process. The fans promote air movement within the room to produce intimate uniform mixing of water vapor and air. This constant, gentle movement minimizes the development of hot, dry zones near electric driving motors and other points of high heat input.

The improvements in humidifying efficiency, by the introduction of compressed air atomizers, were paralleled by the changed over from manual control of relative humidity to automatic control of the degree of relative humidity by automatic humidistats. These turn the atomizers on and off as required to maintain a constant relative humidity best suited to the textile process involved. The development by AMCO of rugged, sensitive and dependable humidity controls made possible the automatic operation of the humidifying and evaporative cooling system described above in which thermostats maintain the temperature for worker comfort and automatic humidity controls maintain the optimum relative humidity for efficient processing.

Not only natural and synthetic textiles in process but also textile machinery using hygroscopic material in such items as drive belts, harness straps, shuttles, spindles, etc., undergo changes in strength and in dimensions with changes in relative humidity. The demand for increased production speeds has made more precise control of relative humidity a must for efficient operation of textile machines. High speeds

in complex machines with many reciprocating motions have pointed up the need for dimensional stability of all the working parts. With both dimensions and strength of parts subjects to change with changes in relative humidity, precise control of relative humidity is becoming more important with each increase in speed of operation. Maintaining close control of relative humidity cuts down on the time required and the cost of making adjustments to textile machines.

There are several materials and combinations of materials which will register changes in relative humidity, but most of them also respond to changes in temperature, producing a mixed response which lacks precision. One natural material, taken from the lining of the intestines of cattle, shows a large response to changes in relative humidity without being appreciably affected by changes in temperature. This material, selected many years ago and repeatedly tested against competing materials for the same duty, has been used in a series of AMCO Humidity controls, each new model incorporating improvements. The latest improvement uses a change-anticipating mechanism for mechanical feed-back to greatly increase the sensitivity of the interpretation of changes in dimensions of the natural humidity sensor to give finer control of relative humidity than was previously available.

Close association with the textile industry for over seventy years and daily contact by AMCO representatives with mill personnel responsible for finding solutions to operating problems have resulted in AMCO developing and marketing a number of special devices useful to the industry. Varying humidity conditions in a picker room change the weight of standard laps, so in weighing laps their weight must be corrected for the prevailing relative humidity. Using the same relative humidity sensing means used in its humidity controls, AMCO supplies a lap weight indicator which tells what a standard lap will weigh less if the relative humidity is low and more if its high. This prevents unnecessary rejection of laps for weight excesses or deficiencies and reduces to a minimum gear changes in succeeding processes. High on the problem list of mill operators is the difficulty of keeping looms clean to maintain quality and uninterrupted production. The weaving process involves thousands of motions involving friction between fibers and fibers and with machine parts. These motions and frictions release waste in the forms of fly and dust and if this accumulates on the loom the results are costly. Operating on the prin-

ciple that it is less expensive and more productive to keep looms clean than to stop production for cleaning, the AMCO Heliclone Loom Cleaner provides automatic, repetitive cleaning of looms, blowing away waste as it is formed. Air directed by swiftly swirling nozzles is driven in powerful jets, forming overlapping oval patterns, to blow waste from both machine and the fabric being woven. This prevents the weaving of defective fabric and waste accumulation on stop motions, drop wires, harnesses, reed caps and filling fork grates as well as reducing fire hazards and keeping waste out of motors, switches, cams, gears and treadles. Similar equipment is supplied for cleaning winders and card room ceilings. For thorough cleaning of all types of textile machinery while it is shut down AMCO also supplies a portable, pressurized solution sprayer.

Sling psychrometers and psychrometric scales for quick localized checks on humidity conditions, Atometers for adjusting the capacity of atomizer maintenance, along with dampeners for textile fabrics, leather goods and paper products are other AMCO special devices.

In addition to its straight humidification and evaporative cooling systems AMCO provides full air conditioning services for Industry using central station systems, with or without mechanical refrigeration. These are humidification, dehumidification, cooling, heating and air cleaning. Humidificaton can be performed wholly in the air washer or partly by atomizers in the work rooms. Cooling may be performed by evaporation alone in the air washer or cooling and dehumidification by using water in the sprays which has been chilled by refrigeration. Heating is supplied by heating coils installed in an air washer bypass to take care of reductions below the normal generated heating load. Steam is also used when outside temperatures are low. During shut-down periods steam is used to make up for normal heat losses from the buildings. A useful and money saving variant of the central station system, supplied by AMCO, is the split system. In this system air conditioned to supply minimum humidity requirements is supplied by the air washer and higher humidities, as required for some textile processes, supplied by atomizers installed in the individual work areas. Such systems have proven less expensive to install and to operate.

The textile industry in America, starting as it did at the Slater Mill in Pawtucket, Rhode Island, and spreading north to Canada, south to the Gulf of Mexico and west to the shores of the Pacific Ocean has been continuously served by American Moistening Company since 1888. It first had its headquarters in Boston, Mass., moved from there to Providence, Rhode Island and in 1956 moved again to its present headquarters in Cleveland, North Carolina, closer to the geographical center of the textile industry today.

By close contact with the problems of the textile industry and a continuing program of research and development for equipment and devices to meet those problems as they develop and change from year to year, AMCO has grown and continues a leader in supplying superior equipment, systems and devices to the Textile Industry. Both systems and textile specialties are invented, developed and field tested by the AMCO research and development division. They are then announced, sold and serviced by the AMCO Organization to make them practical, efficient and good investments for the textile trade.

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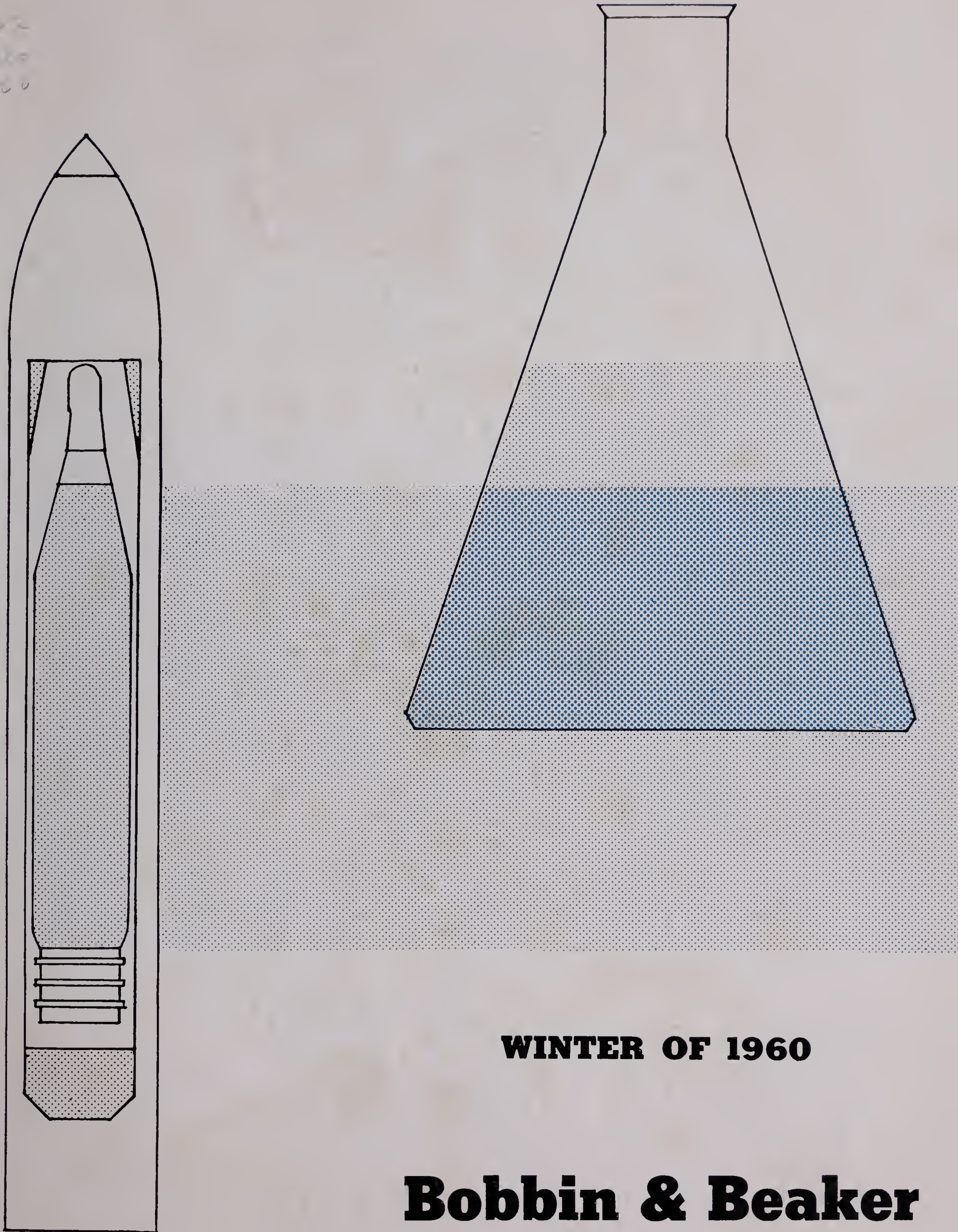

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In This Issue

THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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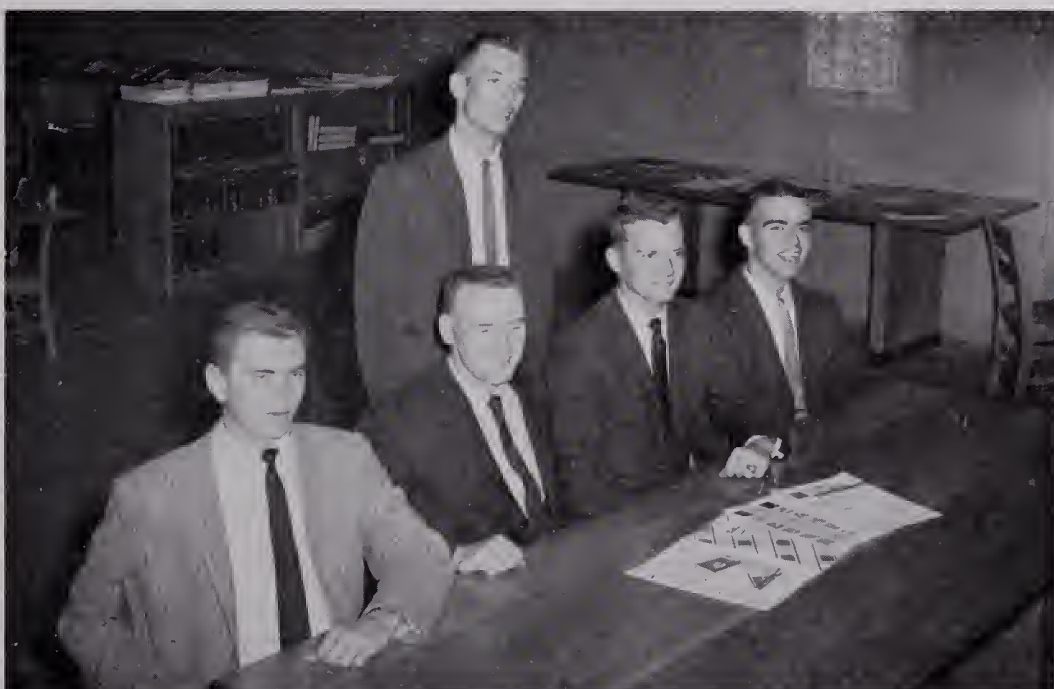
from the Editor

This school year is the twentieth consecutive year that the Bobbin and Beaker has reached the textile industry. In this issue you will find the history of Burlington Industries as well as articles from several textile concerns concerning their products, industrial relations and other topics. The Clemson Alumni's attention is again called to the new column written by Dean Gaston Gage of the School of Textiles.



The 1959-60 Bobbin and Beaker staff seated from left to right: Gordon Ferguson, Advertising Manager; Samuel H. Fleming, Circulation Manager; Charles Bagwell, Business Manager; Tommy Ariail, Managing Editor; standing, Alan Bell, Editor.

Development of Gaston County Dyeing Machine Company

Founded in 1921 by Robert F. Craig, well known textile executive and mill owner, Gaston County Dyeing Machine Co. has progressed from a small local shop to its present status of the world's largest producer of pressure dyeing and drying machinery. The founder felt that a county with more than 100 textile mills within its borders would be well known throughout the textile world so the firm was named for the county in which it is located. The present management includes two sons and two grandsons of the founder.

In the early days all equipment was made of cast iron, which was inexpensive and had many good qualities, but it also had many disadvantages for wet-processing equipment. During the 1930's it became apparent that some corrosion-resistant and stain-resistant metal would be necessary to replace cast iron for dyeing operations. After experiments with brass, aluminum and monel metal a decision was made to try a new type of metal being developed in steel mill laboratories. This proved to be a wise move since the new metal was stainless steel, which is now widely accepted for processing equipment.

In 1940 Gaston County introduced the first automatically controlled dyeing machine. With today's emphasis on automation it is difficult to realize that less than 20 years ago it required a real selling job to convince mill management that automatic controls were necessary and worth the additional cost. Since those pioneering days many types of controls have been developed so the dyeing machine of today performs its function with a minimum of attention from the machine operator.

In 1950 Gaston County pioneered the development of machines for high temperature-high pressure dyeing of man-made fibers. This development assumes greater importance each year as more new fibers come from the laboratories and production plants of the large chemical companies.

A new concept of yarn package drying was introduced to the American textile industry by Gaston County in 1956. Closed system, static pressure, rapid dryers are now accepted as the most efficient method of drying available. Completely automatic in operation, these machines will dry 500 pound batches of yarn in approximately one hour as contrasted to 6 to 18 hours required by older types of yarn dryers. Heated air under high pressure (75 PSIA) is circulated through the yarn at a temperature of 280°F or higher and the moisture from the yarn is condensed and trapped from the closed system without loss of air pressure. In addition to the obvious advantage of fast production, this equipment improves yarn quality due to short exposure to heat and the elimination of yarn contamination from the atmosphere. It has a lower operating cost per pound of yarn processed than any other type of drying.

Although the company has specialized in package and beam dyeing and drying equipment during its entire history of nearly 40 years, it also produces pressure dyeing machines for fabrics, autoclaves for heat setting, raw stock dyeing machines and special machinery, custom built to customer requirements.

Plant facilities include a new fabricating and assembly plant completed in 1958 and equipped with the most modern material handling equipment and metal working machinery such as plate shears, forming rolls, press brakes, punch presses and automatic welding machines.

The machine shop has been expanded to include the area formerly occupied by fabrication and assembly operations. Since the company produces centrifugal pumps, centrifugal blowers, special valves and other machined parts for use on its dyeing machines and dryers, the shop is one of the most complete and modern in the South. It is equipped with late model heavy duty machine tools necessary for machining stainless steel. This equipment includes

many sizes of engine lathes, horizontal and vertical turret lathes, milling machines, horizontal and vertical boring mills, radial drills and a variety of other machines. The shop is able to handle machine work on pieces up to 7 ft. diameter. Because of the scarcity of large machine tools in the South, other shops in the area as well as textile mills and power plants often call on Gaston County for assistance in machining large metal parts.

Gaston County sales engineers, with a combined total of 300 years of experience in serving the textile industry, are well informed and can be very valuable to mills in planning new installations or modernization and expansion of present facilities.

A large staff of engineers and technicians at the home office assist the field force of sales engineers in providing the best machinery designs for individual mill requirements. Every installation is tailored to suit the production requirements of the purchaser.

TEXTILE QUIZ

QUESTIONS

1. Who invented the power loom?
2. When was Textiles introduced into the Clemson curricula?
3. What is the Sulzer loom?
4. What kind of heddles are used to make Leno cloth?
5. Who invented the flying shuttle?
6. How has the cloth removing process on a loom been improved?
7. What new machine can spin direct from draw frame sliver?
8. What is the ideal temperature and humidity of the spinning room?
9. In what year was the modern card invented?
10. What wartime invention is especially designed for sizing nylon during winding?

ANSWERS

1. E. Cartwright.
2. September 1898.
3. A Swiss invention which does away with the regular shuttles.
4. Doup heddles.
5. John Kay.
6. The cloth is pulled through a slot in the weave room floor to the cloth room below.
7. The "Nastrofil" machine invented in Italy.
8. Temperature 75 to 80.
   Humidity 50% to 60%.
9. 1830.
10. The "No. 250 Leesonia" sizing machine, manufactured by Universal Winding Co., Manchester, England.

Industrial Relations at Woodside Mills

The management of Woodside Mills has long realized that a well planned industrial relations program is just as important as their program concerning production and marketing techniques. Woodside management has established an industrial relations policy over the years that has proven its importance in a successful textile operation.

The staff conducting this program at Woodside Mills consists of Industrial Relations Director, who reports directly to one of the Company's Vice Presidents; a Safety-Personnel Director, and a Personnel Manager at each of the company's plants located in Greenville, Anderson, Fountain Inn, Simpsonville, Cateechee, Liberty and Easley, S. C.

The basic functions which are the responsibility of the Industrial Relations Department are:

1. Coordinate operations of the different personnel offices, establishing set policies and procedures.

2. Carry out a program to reduce accidents in the plants through safety training and education, proper medical treatment and prompt and efficient handling of accident claims.

3. Execute a program of public relations, creating goodwill between the company and the public.

4. Promote good employee relations.

5. Establish training programs for supervisors and prospective supervisors.

6. Coordinate company policies. To aid in the interpretation of managements' policies to employees and employees' views and attitudes to management.

The responsibilities which fall under these several divisions of the Industrial Relations program have been definitely outlined in a policy manual which is in the hands of all who are charged with these responsibilities.

Each personnel office has the responsibility of maintaining the proper labor supply at the individual plants. This also includes maintenance of proper records, interviews, orientation of new employees and follow-up and exit interviews with terminated employees.

Personnel offices also handle the insurance program which includes the group hospitalization and life insurance for all employees, Unemployment Compensation insurance and our self insurance program of Workman's Compensation coverage.

The safety program charged with conducting frequent safety committee meeting and inspections, arranging and carrying out various awards programs made for outstanding records and planning and conducting accident prevention education.

To stimulate Woodside's safety program, a Safety Contest is in effect at each plant which rewards employees who have attained outstanding safety records. It is an incentive type program which allows a supervisor to take his employees "out to dinner" as recognition of their attention to safety. Any six months period free of accidents among his group qualifies them for a safety dinner.

In addition to this plan, which is basically for the employee, an Employee-Family celebration is held for any plant which completes a million man-hours or one year without a lost-time accident. Woodside Mills has an excellent safety record so that the employee and family feeds are quite frequent.

Communication is a highly important phase of industrial relations at Woodside. There used to be an old saying that "no news is good news", but that is not the thinking of Woodside management. Woodside attempts to advance the idea to the employee that their interests and management's interests are one and the same and that basic to all managements' acts and policies is the principle that its first concern must always be for the well being of its employees.

One of the strongest medias used in this communications program is an eight page tabloid newspaper, "Woodside Chain News." This newspaper contains announcements and messages from top management, editorials, changes effecting the employees, modernization announcements and feature articles on various programs such as safety, quality and waste control, and many others.

Supplementing the newspaper are bulletin boards throughout the plants, weekly information bulletins originating from the personnel departments and posted on the boards, special informative meetings and direct contact between supervisory personnel and employees.

External communications include news releases to daily, weekly and trade publications on happenings within the mills of interest to the general public. Displays of finished products also are arranged for fairs and other public gatherings. Planned tours through the plants for community leaders keep them posted on the advances made through constant modernization.

Training programs include those for supervisors which present information and training that will help him carry out his duties as the immediate representative of company management to the employees. Follow-up and progress reports are made as new employees are trained.

Woodside has long been a leader in textile recreation and athletics. Four full time program directors and some part time directors carry out year-round programs. These programs are primarily for children of employees, however, employees have full access to the well equipped community buildings and gymnasiums at most plants.

A broad employee health program is in effect at Woodside under the direction of the Industrial Relations Department. Pre-employment physicals are mandatory for new employees and physical requirements, including visual standards must be met. This program has aided the health standards of employee by pointing up physical deficiencies which in most cases can be corrected before or during employment.

A number of special projects are undertaken by the Industrial Relations Department from time to time. A pictorial brochure describing Woodside Mills, was developed to show the progress of the company over the years. Special publications which aid the plant programs in cost, quality, safety and others are developed as needed.

Falling under the general supervision of this department are a number of special benefits for employees and members of their families. Gold watches are presented each year to a number of boys and girls selected as outstanding during their participation in the recreation and athletic program. College scholarships valued at $3,000 are awarded annually to the son or daughter of a Woodside employee. One half the cost of correspondence courses is paid for employees furthering their education in textiles. A savings plan is set up for employees who want a systematic method for saving by payroll deduction. These, plus many other employee benefits, round out a program designed to make the Woodside employee feel that he is a part of an organization which is interested in his well being.

While the Industrial Relations Department at Woodside operates under well-defined policies developed over the years by management, these policies do not remain static. They are constantly reviewed as conditions change to the end that the program will be effective and result producing.

What a Textile Graduate Can Expect

This school year there is a definite trend upward in the starting salaries being made by many textile companies which have interviewed at Clemson. The average offer is well over $400 per month with several offers nearing the $500 per month mark.

Practically every textile student who will graduate this year has had several job offers. There are openings in sales, research, production, personnel, engineering, management and many other related fields. There seems to be an increase in the competition among the textile firms for the textile department graduates due to the ratio of graduates to the number of jobs open. Even if all the textile graduates do enter the textile industry many other openings will have to be filled from industrial management and engineering departments due to the large number of jobs available.

Many of the companies are also adding attractions to induce the better students to come to work for them. Several have added retirement programs for the management while others have added incentive and bonus plans for beginning executives.

Training programs of various forms are also being set up by many of the textile concerns. This has especially proved effective in securing the young graduates who are interested in the production fields. Many of the companies are also sending employees back to Clemson during the summer months to attend the short courses offered in the various textile fields.

The companies' interviewers look for different qualities in the graduates as they talk with them and inspect their records, but all seem to favor the student who has had some experience in textiles even if on a very limited level. A student with an outstanding extra-curricular activity record usually is an outstanding leader in industry. Of course grades play an important part in the selection of the graduates.

During the next few years there will be even more job opportunities for college graduates in the field of textiles and competition is expected to increase even more among the companies looking for management trainees.

Many of the large companies and larger chains of mills are even hiring graduates with military obligations. They hope that by working the young men the short time before they must enter the military service they will be able to rehire them after the military obligation is complete.

June 17, 1958

M E M O R A N D U M

Re: **Supervisory Apprentice Training**

I would like to set down in writing some thoughts as to how we should handle any college graduates or those we might desire to work through the plant on a training basis. It is thought that, if possible, the trainee should begin in the Standards Department as it would affort him an opportunity to better acquaint himself throughout the mill before starting in the productive departments. The following schedule is suggested:

Standards Department	1 Month
Weaving Department	3 Months
Warping & Slashing	2 Months
Dye House	1 Month
Spinning	1½ Months
Card Room	2½ Months
Designing	1 Month
Cloth Room	½ Month
Shop	1 Month
Technical Department (Laboratory and Machine Inspection)	1 Month
Total:	14½ Months

The above suggested schedule may vary due to the progress being made by the trainee or the need to adjust the schedule due to departmental conditions.

If a department has not already done so, it is suggested that each department head make out a tentative outline of what they propose that such trainees do in their deartments and give such copy to me.

The department head should check frequently on the progress being made by the trainee, and at the end of his time in his department, he should make a report on the trainee which would show the progress he has made, his knowledge of the technical phases and especially how he got along with other people.

Each trainee will also be asked to write a report covering the work done in each department; and these reports, together with the reports from the department heads, will be kept as a matter of record.

It is suggested that the Personnel Manager follow the schedule of any such trainees to be certain that they are moving from one department to the next upon completion of the suggested training period unless it is agreed that their stay in any department should be longer.

If there is any further questions concerning this procedure, please let me know.

____

Plant Manager

Copy to:

Personnel Manager

All Department Heads

The textile concerns send their representatives to talk to the prospects; from the students interviewed several are usually invited to visit the various plants and become familiar with their types of operations. If the student is still interested following his visit an offer is made soon thereafter. Many of the students choose the company with which they will work by the type of work they plan to do and not from the financial viewpoint alone.

The training program that is given by most mills is probably of as much value to the textile graduate as a Master's Degree. It gives the graduate the much needed practical experience that is necessary before he becomes an executive.

Following is a memorandum issued by one of the leading textile firms in Tennessee concerning the type of training program this concern has developed to best train graduates in the cotton division of a fancy goods mill:

MEMORANDUM

Of course all training programs vary and must be modified as to the type of mill. It is rapidly becoming practically a necessity for every mill to develop some type of training program however.

In summary, the 1960 graduate can expect: (1) excellent working conditions; (2) higher beginning salaries; (3) more thorough and well-rounded training programs; (4) retirement programs; (5) jobs of the type or in the branch which they prefer.

Burlington Industries, Inc.

Burlington Industries, Inc., largest and most diversified textile manufacturing organization, began in North Carolina just 36 years ago.

From a single small plant in Burlington, N. C., the Company has grown to more than 120 plants in more than 90 communities in 16 states and four foreign countries. There are 58,000 employees in the far-flung enterprise today.

Mainspring to Burlington's phenomenal growth is Spencer Love, founder and chief executive of the Company. Mr. Love has remained at the helm of the Company from its beginning and is today Chairman and President of Burlington Industries, headquartered in Greensboro, N. C.

Young men were—and are—among his key executives in building the world's major textile concern.

Because the Company is young and growing, there must be emphasis on management development and executive training. Thus, Burlington each year seeks young men of imagination, initiative and ability, who find rewarding careers with Burlington.

Mr. Love said recently: "One of the problems facing American industry today, and particularly the textile industry, is the expanding need for management-caliber personnel. Virtually unlimited opportunities exist, and the selection, training and development of young people to fill the managerial jobs of tomorrow has become vital to us.

"More than ever before, challenging and exciting careers are available in textiles. Our industry can be very rewarding to those with ability, those who are willing to learn the business and make a real contribution to its progress. The competition in textiles does result in keen and constant demand for good talent, and thus the opportunity for financial rewards must be commensurately greater in order to meet the demand."

Burlington's diversification within virtually every phase of textiles makes available a variety of career opportunities—in many different fields—to the graduate concerned with personal growth and development and a career in line for staff management.

While a young man after World War I service as an Army officer, Mr. Love worked at his first textile job in Gastonia, N. C., and soon owned the mill.

When the possibility of a new plant in Burlington came up in 1923, Mr. Love sold his Gastonia real estate and moved his machinery to Burlington, which gave its name, its blessing and some of its money to help the new textile plant get underway.

Cotton mills of that day were having difficulties, but Mr. Love became interested in a little-known man-made fiber, rayon. It was a start that within 10 years was to take Burlington to a predominant position as the largest weaver of rayon fabrics in America.

In 1925, only two years after the Company began, a wooden wall was installed at Plant Number Two at Piedmont Heights in Burlington. Plant Number Two was an expansion of the Company's first plant. The temporary wooden wall, which could be easily removed for future expansion, was symbolic of the spirit of progress shown by Company leaders who firmly believed that Burlington would succeed and grow. The Wooden wall, a door to the future, was often repeated as swift expansion became a Burlington trademark.

By 1937, Burlington had established 30 new rayon weaving plants with sales of $27,000,000 annually, and that year made its first public stock offering on the New York Stock Exchange. Every year since, Burlington has earned a profit and paid consecutive dividends.

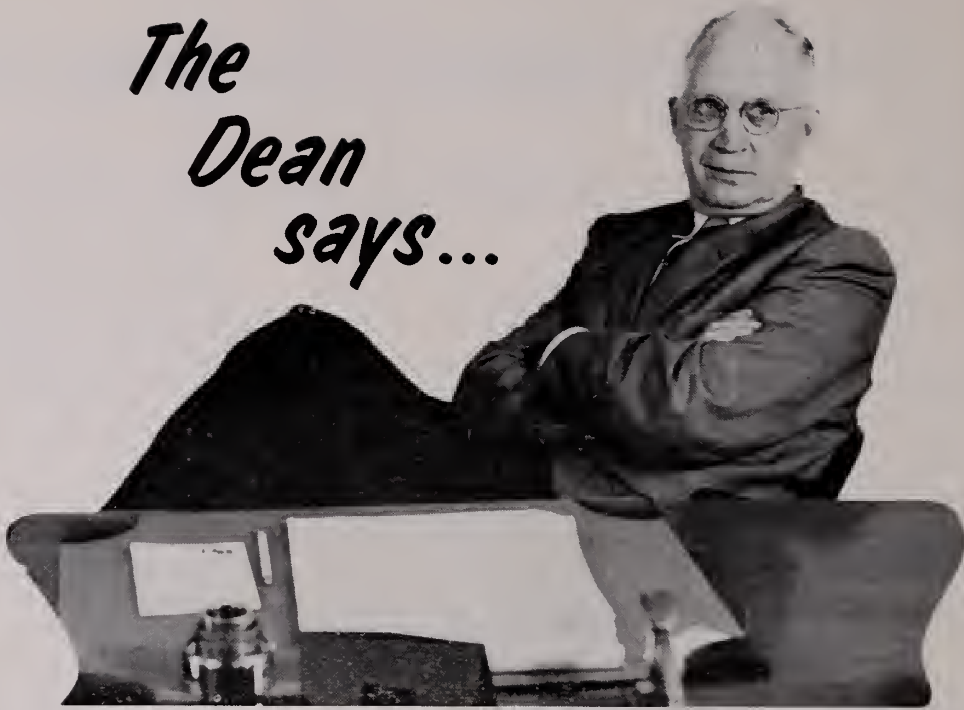
The Company had weathered the Great Depression, expanding while other textile mills were closing. In 1938, Burlington began building full-fashioned hosiery plants, the same year that DuPont introduced nylon. When the war came in 1941, Burlington had 40 plants and sales of 63,000,000.

Burlington's pace accelerated after World War II, through expansion of existing operations and acquisition of promising companies in other textile fields. These developments brought Burlington into tricot fabrics, for lingerie and blouses; into the ribbon and narrow fabrics business; more significantly than ever into hosiery; and for the first time into the dyeing and finishing field. Later there were even broader diversifications into woolens, worsteds, cottons, vinyl-coated fabrics, glass fabrics, upholstery fabrics, woven and knitted pile fabrics, and many others.

Burlington produces an endless array of textile products. It is a major supplier of fabrics for every type of apparel, for the home, and for industrial uses.

(continued on page sixteen)

The Dean says...



The trustees of the J. E. Sirrine Textile Foundation met at the School of Textiles on November 14. They were the guests of the college at lunch and at the football game. Most of you do not realize what this foundation does for the School.

* * * * *

We are in the process of getting bids to air condition two processing laboratories. One will be for weaving and one for yarn manufacturing. These laboratories are essential if we are to carry out our research program. They will be located on the first floor where the old freshman laboratory was.

* * * * *

David Gentry, '55, has accepted a position in our research department. He received his masters degree at the Institute of Textile Technology at Charlottesville in 1957 and has been in research since. He will be a great asset to our program.

* * * * *

I, along with the heads of other textile schools, visited San Joaquin Valley in California in October. We were guests of the National Cotton Council. That trip was an eye-opener. We visited one ranch that was sending 1000 bales of cotton a day to the gins and last year averaged 4½ bales to the acre on 20,000 acres. No boll weevils and no rain, everything is irrigated. They have a great program in plant breeding at the Shafter Experiment Station.

Betts Wilson has been hard at work on the recruiting program. He has visited high schools, talked to students and has secured names and addresses of boys who say they are interested in textiles as a career. These names are being mailed out to the mills in the students home community. Please give this program any help that you can.

* * * * *

As you know, we have, for several years, offered graduate work in Textile Chemistry. We are now working on a gradute program in Textile Management. There is a faculty committee headed by Professor Campbell working on this program.

* * * * *

The USDA Pilot Spinning Plant is now running its 1000 spindles on two shifts. Plans are in the making to do some weaving as well as spinning in the overall program.

* * * * *

J. D. Hollingsworth and Sons is giving us a "granular" card change over. It will be installed on a Saco-Pette card of about 1902. This will make an old card modern by donations. Large 42 x 18 coiler by McDouough Power Equipment Company, comb box and comb by Southern States Equipment Company, individual drive by Earuhard Electric Service, licker-in hood by Textile Sheet Metal and metallic clothing, licker-in clothing and now granular top by J. D. Hollingsworth and Sons. We appreciate these gifts.

Outstanding Seniors . . .

David Lee Cain is a Textile Management major from Slater, S. C. David is married and is living at Clemson while attending school. David majored in Mechanical Engineering for his first two years at Clemson. Since changing to textiles, David has made honors every semester.

David is a member of the NT-MS and the SAM. David has worked three summers at the J. P. Stevens Company, Inc., in Slater, S. C. David has been helped through school by the Veterans Orphans Benefit, free tuition from the State Government, and the Board of Education Scholarship.

When David graduates he will probably enlist in the Army for six months and then serve in the active reserves for several years.

Mack E. Atkinson is a textile Chemistry major from Spartanburg, S. C. Mack has gotten that much needed experience in textile research by working two summers at Reeves Plastics, Inc., three summers at Fairforest Finishing Plant in Spartanburg, and one summer at National Starch and Chemical Corporation. Since he plans to enter the research phase of the industry, he has gained valuable experience.

Mack has received scholastic honors four out of six semesters at Clemson. He is also president of the Phi Psi and a member of the Council of Club Presidents.

Mack has been helped through school with two different scholarships. His first two years he received the Reeves Brothers, Inc., scholarship and his last two years received the Ciba scholarship.

Dan L. Brewton is a Textile Manufacturing major from Greer, S. C. At the present time he lives in Clemson with his wife and two children. Dan served in the Army from 1954-1956 as an instructor in Teletype and Message Center Operations.

Although Dan has the responsibilities of being a family man, he still finds time to be treasurer of the Phi Psi. Dan also received scholastic honors the second semester of his freshman and sophomore years and both semesters of his junior year.

Dan received the Keever Starch Scholarship for his senior year to help with his expenses while at Clemson.

BURLINGTON INDUSTRIES Inc.

(continued from page thirteen)

It is the largest weaver of man-made fibers, of worsteds and woolens, of glass fabrics, the largest of hosiery manufacturers and one of the largest factors in cotton textiles.

Only two fibers, rayon and cotton, were used by Burlington 36 years ago. Today the Company utilizes more than 26 natural and man-made fibers, as well as blends of the various fibers which makes possible new and better fabrics, each with special advantages for particular uses.

Rated 53rd in size by Fortune Magazine's 1958 survey of the 500 leading industrial firms, based on sales volume, Burlington's 1959 fiscal year sales totaled $805,450,000, while 1958 sales amounted to $651,461,000.

Recently Burlington's dynamic Mr. Love, in a foreword to a new Company brochure, summed up operations and philosophy of the Burlington organization in this manner.

"We are largely in a fashion business, and sales are affected by fashion and consumer preference as one fiber or fabric replaces another. By operating in all textile fields Burlington is better able to operate profitably, overcoming the peaks and valleys associated with nondiversification. Direction and purpose, and efficiency and economy, are possible through centrally managed functions and staff services. Broad forward planning major policy decisions are vested in experienced over-all management and an active Board of Directors.

"To these advantages add diversification into almost every textile field . . . modern plant facilities and equipment . . . competent personnel . . . constant research and development of new and better textiles . . . consistent high-quality standards . . . Imaginative designing and styling complemented by hard-hitting merchandising and selling . . . and you have the reasons for Burlington's growth.

"Our creed is a simple one: To serve the best interests of our customers, our employees, our stockholders, and the communities in which we operate.

"The future holds new and exciting developments for textiles—progress that will far overshadow all that has gone before—and Burlington intends to be the leader."

ZEFRAN

Reprinted from AMERICAN FABRICS

All fields of industry consist of two distinct types of producers: (1) the Me-Too group who rush to imitate the originators and (2) the Me-Better individuals who recognize that a surer way to success lies in **doing it better.** It is in the latter category that Dow's new Zefran fiber comes; more than that, it has always been a ruling factor in the determination of **any** new venture that if the company could not make something better than existing competition Dow would not make it at all.

Dow started in 1897 at Midland, Michigan. Herbert H. Dow was a young chemist who had devised new processes for extracting bromine and chlorine from natural brines; it was not long afterward that his company added calcium and magnesium compounds from the same source, and to this very day brine chemistry is a major part of the entire Dow operation. From here to a fiber development like Zefran might appear to be quite a jump; actually the latter is the result of a gentle transition achieved through research. Dow annually invests 3% of its total sales in research, always keeping in mind Herbert Dow's precept: **If we can't do it better, why do it at all?**

From Organic Chemistry to the Aesthetic

During World War I, Dow entered the field of organic chemistry; the company was responsible for the first American production of synthetic indigo dye, and synthetic phenol which is one of the work horses in chemistry and the starting point of a widely used plastic; during the same period Dow undertook the production of metallic magnesium, and ultimately the name of Dow became synonymous with magnesium.

By World War II, the company was ready with the only commercial production of styrene; this is one of the two major components of synthetic rubber, and it is also the base from which polystyrene plastic is made; four huge plants which Dow built and operated to produce magnesium and styrene worked exclusively for the Government. When the founder of the company died, his son Dr. Willard H. Dow was made president and guided the company for 20 years; upon his death in a plane crash in 1949, he was succeeded by Dr. Leland I. Doan who was then director of sales. The company has grown considerably; it is today the fourth largest producer of chemicals in this country . . . but the one basic philosophy has remained constant: **either do it better, or don't do it at all.**

Today Dow produces several hundred different chemical products; each has led to another in close and logical affinity. To list the succession of plastics developments by the company is unnecessary; the main point is that it was merely a matter of time before Dow would get into fibers . . . and specifically into the production of a fiber like Zefran. But here again, despite the fact that Dow had the facilities and a waiting market, Herbert Dow's thinking dominated.

Manifold Objective for Zefran

The assignment given to the research and development staff was this:

1. What type of fiber has a logical and waiting market?

2. What characteristics do existing competitive fibers lack?

3. Which features should be added or substituted to make the fiber easier to finish, easier to manipulate into good fabrics and to create easy-to-needle fabrics?

The first decision, from the marketing staff, was that Dow should bring out an acrylic fiber. True, others existed; but field research unearthed the fact that several desirable characteristics would be warmly greeted by everyone concerned, from fiber spinner to consumer. Generically, what was urgently needed was a new acrylic with built-in **aesthetic** features . . . and now the baton was handed to the laboratory technicians: the making of **an** acrylic was not the objective; rather, it must be an acrylic which would have a better dye affinity, one which would **resist** pilling, one which would have more of the **hand** which typifies the natural fibers.

Zefran, originally titled Q-1204 was born after **nine years** of ardous research effort. It was the result of

teamwork by the chemists under Dr. G. William Stanton; it stemmed from a most careful screening of the many types of polymers to find the one best suited to modern needs. In the course of this research many fiber possibilities were hit upon, some of them already in existence and some in improved versions. But it was not until the very end that the chemists finally developed the formula for the one acrylic which not only matched existing fibers in structural and functional form, but was endowed with **all** of the aethetic features which Dow sought.

The virtues of acrylics were already known to textile chemists before Dow started on its own study . . . but so were the disadvantages. Here, again, the thinking of Herbert H. Dow was put to work: **do it better, or don't do it at all.** First came field research among consumers, weavers, finishers, cutters and retailers. Good as acrylics were, what would it take to make them better? When the great mass of data was correlated and analyzed, the factors which had to be included.

1. A new acrylic would have to take dyes better than existing fibers.

2. It must be economical to produce, easy to manipulate.

3. It must be widely adaptable, to meet the varying needs for a great diversification of finished product.

4. It must be adapted to blending with other fibers.

5. It must have a more natural hand, or feel.

6. It must contribute better draping and needling qualities, to reduce sewing costs.

7. It must reduce the tendency toward pilling.

8. It must parallel the leaning to Wash and Wear fibers.

These were the goals which were put before Dow's chemical technologists in the plant at Pittsburg, California and Dr. G. William Stanton, chief of this group. Work started on this project in 1949; for the Fall season of 1958, Zefran made it bow as the **fait accompli.**

Zefran Goes Through Actual Experience

One of the most significant portions of Dow research on Zefran is in the pilot plant built at Pittsburg. In this building Zefran, from its inception, has been subjected to every type of actual manipulation through which it must pass in secondary hands. This includes every step of processing from spinning through cutting and sewing; it puts Zefran up against the problems anticipated when it has to be dyed, woven, finished, cut and then needled and pressed; if any troubles show up in the pilot plant, the way to overcome them is developed before Dow's customers and their customers go into production. Thus, there is almost a prior guarantee of satisfaction attached to the fiber.

Technically, Zefran, like other acrylic fibers, is based on the raw material **acrylonitrile,** which is a derivative of natural gas; the big difference is that somewhere along the line of production, a dye-receptive component has been incorporated into the fiber. Because of this, Zefran is given a greater flexibility in the choice of dyestuffs that can be used to color it, than **any** other fiber whether natural or synthetic, without sacrificing any of the inherent physical properties of the fiber. Exceptional dyeability **on standard equipment,** outstanding resistance to pilling, good dimensional stability, a pleasant hand and durability have already been scientifically (and through practical testing) **proved** to be Zefran's strong points in either woven or knitted fabrics.

Still Being Improved

No one at Dow calls Zefran a miracle fiber. They hasten to point out that despite its many advantages, Zefran still faces certain chemical problems which are being worked on: a sensitivity to highly alkaline solutions in bleaching (for which Dow already has a corrective recommendation); Zefran does not now spin into the high bulk yarns currently popular in some sweater applications; dyeing Zefran in special shades presents peculiar problems which Dow's technical service group can help to solve.

But the facts already proved indicate that Zefran is not only a new acrylic but in many ways what Herbert H. Dow asked for: **a better one.** With a better fiber came the problem: **How to merchandise it best?** It was decided that rather than throw Zefran onto the open market, a sounder plan would be to place it carefully with a selected group of fabric producers; they in turn would not only develop specialty fabrics but channel the distribution to manufacturers noted for their openess to new ideas. In short, the introduction of Zefran for Fall 1958 was to be in the form of **limited editions** . . . and this is precisely what is now available. Those millmen who have been working with the fiber report that it offers ease of processing on conventional equipment, and that it presents an unusual ability to take fast dyes without the use of pressure, carriers or other extreme conditions. Manufacturers state that the various types of cloths woven and knitted with yarn made from Zefran offer no problems in factory handling; and

(continued on page twenty)

A Progress Report on Plastic Shuttles

In the Summer, 1957 edition of the Bobbin & Beaker, the SOUTHERN SHUTTLES DIVISION OF STEEL HEDDLE MFG. CO. was privileged to present an article on its plastic shuttle—the SOUTHERN DURAMOLD. This present article will attempt to cover the additional information and further results obtained during the intervening two years.

In mid-1957, plastic shuttles, while having completely emerged from the development stage, were still in their relative-infancy as a production item in the country's weaving mills. Since then plastic units have rapidly become the standard and sole shuttle used in countless mills on all types of looms, and on many, many different fabrics. For example: it is estimated conservatively that almost 35% of the looms operating in the state of South Carolina are weaving with plastic shuttles and approximately this same proportion will be found in all sections of the textile industry. It is significant also that this tremendous acceptance has come about in the short space of the last two or three years.

At the present time nearly 20% of the shuttles produced by the SOUTHERN SHUTTLES DIVISION are made of our DURAMOLD material, and it is felt that this proportion will continue to grow very rapidly over the next few years.

It is further interesting to note the types of fabrics upon which these shuttles are being used so successfully. Since initial concentration was in this field, the majority of DURAMOLD shuttles are employed in the weaving of cotton. There is also a very wide usage in the field of spun synthetics. Although the introduction of plastic shuttles in the sizes required by woolen and worsted looms has been made more recently, they are presently cornering a sizable portion of this market. It is only in the field of fine filament weaving that a widespread acceptance has not been forthcoming and the reasons for this will be examined later in this article.

DURAMOLD-type shuttles have returned a particularly rewarding performance in conditions where the shuttle design is comparatively weak. (As an example: in shuttles of the overall specifications proper for an 8" quill, which have been redesigned to accommodate an 8-3/4" quill.) In wooden shuttles produced to these designs a higher degree of failure through splitting is encountered than is the case in conventionally-designed shuttles. However, when DURAMOLD material has been used for shuttles of this type (known as LEP—Larger Filling Package—Shuttles) this splitting has been eliminated and complete satisfaction has been gained.

Figures as to the life expectancy of DURAMOLD shuttles compared to conventional shuttles varies from mill to mill. It is generally conceded, however, that a life ratio of 3 to 1 in favor of the plastic shuttles may be reasonably expected, and performance considerably in excess of this is not out of the ordinary.

To cite examples:

One mill has considered several tyes of looms running on DURAMOLD for the last full year and has compared shuttle-consumption with their shuttle-consumption for wooden shuttles the year before. On a block of C & K jacquard looms the shuttle usage ratio of DURAMOLD to dogwood

is 1 to 6.38; on a block of terry looms the ratio was 1 to 4, and on a block of C-5 looms the ratio was 1 to 3.38. This mill has computed their total savings in shuttle costs for the year at almost $3,400.00.

Another large group of cotton mills has reported that after large-scale tests for 13 months, the average life of blocks of DURAMOLD shuttles was 47.7 weeks, as against an average life for wooden shuttles of 14.3 weeks. In addition to this, it is interesting to note that 60% of the DURAMOLD shuttles involved in the test were stil running on the date when these figures were taken.

As was to be expected in projects of this sort, several minor problems concerning plastic shuttles arose during their development. However, one by one these have been eliminated through proper design and improved material, to the point where today the only remaining objection appears to be the increased weight characteristic of all plastic shuttles. The materials molded into DURAMOLD shuttles have a specific gravity of approximately 1.35 as compared to a specific gravity of .8 — .85 for dogwood. In finished shuttle stage this amounts to 1-1/2 to 2 ounces in an 8"-quill cotton shuttle (due to the percentage of the shuttle's weight that comes from the metal fittings which remain standard, regardless of the body material itself).

In most instances the weight objection is magnified beyond its true significance. Through proper loom adjustments DURAMOLD shuttles may be boxed in almost any loom with relatively the same force found with conventional wooden shuttles. This has been proven many times in mills where early complaints on weight were received, but where DURAMOLD shuttles were adjudged completely satisfactory after experience in running them had been athered. Due to the delicate nature of the yarns involved, this weight increase has been, and continues to be a source of particular trouble in the weaving of filament yarns. It is something upon which research is presently being concentrated, and it is felt that the objection may be removed within the near future.

Another problem which arises from time to time deals with the replacement of certain metal fittings, notably the grip or spring which holds the bobbin, in plastic shuttles. This higher replacement frequency is the result of the extremenly long life of the shuttle and such replacement is to be expected. However, unless attention is paid to replacing the grip at the proper time, a condition can arise where grips that are worn out are allowed to continue to operate in DURAMOLD shuttles, with the resulting drop in the bobbin. This, of course, will result in filling breaks and must be guarded against through periodic inspection of the grip and replacement where indicated. In addition, SOUTHERN Research is striving constantly to develop long-lasting, better grips and fits and several promising designs are presently being evaluated in selected mills.

In summation, it is felt that the DURAMOLD shuttle has justified the confidence that the SOUTHERN SHUTTLES DIVISION has had in its future. It is at present a very important product on the shuttle market and we are confident that it will continue to gain in use until within a very few years more DURAMOLD plastic shuttles will be produced than are produced out of dogwood.

ZEFRAN

(continued from page eighteen)

the retailers who have committed their stores to Fall purchases anticipate good acceptance by the consumer.

But Dow is not shutting off its research and development work at this point. The same technical services which were offered in the very beginning are still available to every business company which works with yarn made from Zefran, or is seeking to develop new products; and always there is the Dow service which offers to put the yarn through a test run under the actual future handling conditions which it must meet, to iron out bugs **before** the spinner, weaver, knitter, finisher or manufacturer gets involved.

First Fabrics Now Available

Among the fabrics available this Fall are wool and specialty fibers blended with Zefran for women's, men's and children's apparel; blends with rayon in dressweight goods; and 100% new fabrics being in the development or finished stage right now. Union-dyed blends of Zefran have created a great deal of interest among mills; pad-steam dyeing in the larger cotton mills, in the regular cotton technology, has produced excellent results for Fall; printed cloths combining Zefran with cotton will be vat-dyed for Spring and Summer fabrics, based on satisfactory tests already made. And for both men's and women's suits, a 6- to 6½-ounce tropical worsted blend with Zefran promises to be a successful venture.

The new fiber will be aggressively promoted by Dow, by the fabric makers and by the manufacturers who are showing Zefran. The simple statement of facts about Zefran should see this new fiber in millions of consumer homes within a short period of time.

Phi Psi News

At the first meeting of the Iota Chapter, Phi Psi, at Clemson College, eight new members were tapped. These members were invited to become members of the National Honorary Fraternity established on the Clemson campus in 1927.

Those chosen were: Aubrey A. Adams, Textile Management Junior from Union, S. C.; Tommy Ariail, Textile Engineering Junior from Sevierville, Tenn.; Gene C. Floyd, Textile Science Senior from Clinton, S. C.; Jay Adams, Textile Science Junior from Spartanburg, S. C.; Steve C. Francis, Textile Management Junior from Blacksburg, S. C.; Orren F. Hunter, Jr., Textile Science Junior from Clemson, S. C.; John B. Swart, Textile Management Junior from Caracas, Venezuela; and W. Harral Young, Jr., Textile Management Junior from Sumter, S. C.

The first two degrees were given the new members by Grand Council President Bellemere and Second Vice President Anderson along with Grand Secretary W. C. Whitten on October 27 following a banquet at the Clemson House.

The third and final degree was given by the chapter on December 7.

Of interest is the fact that seven of our brothers have received scholarships for outstanding scholastic work. They are: Mack Atkinson, TC Senior, President of the Phi Psi, Iota Chapter, was awarded the Ciba Scholarship; Dan Brewton, TM Senior, Treasurer of the Iota Chapter was awarded the Keever Starch Scholarship; Don Faile, TM Senior, Junior Warden of Iota Chapter, was chosen to receive the David Jennings Memorial Scholarship; Bernard Brown, TM Senior, was awarded the Seydell-Woolley and Company Scholarship; Jay Adams, TS Junior received upon entering Clemson the South Carolina Textile Manufacturers Association Scholarship; Aubrey Adams, TM Junior, received the Southern Textile Overseers Scholarship; and W. Harral Young, Jr., received the Carolina Yarn Association Scholarship.

N.T.M.S. News

The National Textile Manufacturing Society is enjoying an active year under the supervision of their new faculty advisor, Mr. H. B. Wilson.

Several projects have been undertaken for the school year. Field trips have been made to various textile plants which were of special interest to the club members. Several more trips are also being planned.

A party was held at the Boscobel Country Club to better acquaint the members with each other. It was a tremendous success. The Society is also planning to prepare small pillows with "Clemson" on them for sale among the students.

The officers for the current year are: Alan Bell, President; Sammy Fleming, Vice President; Tommy Arial, Treasurer; and Harral Young, Secretary.

The Bobbin and Beaker, official publication of Clemson College School of Textiles, will observe its twentieth anniversary this calendar year. For two decades it has been serving both the textile industry and Clemson students.

This magazine is published four times each year with each issue featuring a theme on some phase of the textile industry; for example, one issue may feature textile machine companies together with their products, while the next issue may place emphasis on research programs in various mills and plants. The staff plans to continue the policy of offering a variety of articles covering the many branches of the textile field to insure a well-rounded magazine for those whom we seek to serve.

20th Anniversary

The Bobbin and Beaker

Each issue of the Bobbin and Beaker goes out to approximately 2,000 business concerns, educational institutions, and individuals. These 2000 copies travel to practically every state in the United States and to several foreign countries. The magazine is mailed free of charge to anyone asking that it be sent.

The Bobbin and Beaker is edited and published by a senior and junior staff. The senior staff is composed of seniors from Clemson's textile school. It consists of an editor-in-chief, advertising editor, circulation manager, and a business manager. The junior staff consists of four juniors from Clemson's textile school; these junior staff members serve as assistants to the senior staff. Together these student staff members carry out all functions necessary for the publication of the Bobbin and Beaker. A faculty member from the School of Textiles serves as advisor for the staff.

Many of the articles that appear in the magazine are written by guest writers from the textile industry. Other articles are prepared by staff members from rough drafts or essential facts sent to them from various sources. A column written by the Dean of the School of Textiles now appears in every issue; this column is especially written for Clemson College School of Textiles alumni; it contains many important happenings in Clemson's textile school. Another column of interest to the textile industry as well as to the Clemson students is the "Outstanding Seniors." This article or column features three Clemson students elected by the faculty, students considered by the faculty to be outstanding in their graduating class.

The Bobbin and Beaker is supported entirely by the advertisements which appear in each issue. The Sirrine Foundation provides the magazine staff with a banquet each spring and provides an honorarium for each senior staff member; it also backs the publication in the event a loss occurs on any issue.

The Bobbin and Beaker was originally organized by the Iota Chapter of Phi Psi Fraternity to be published and distributed to the textile industry. In the twenty years following its organization it has continued to be published quarterly and still serves the textile industry and college students. Future plans are also being made both for expansion and for improved ways for presentation of material. The major draw-back is the financial side of the picture. Larger editions will require many more advertisements which at present are hard to obtain. The Bobbin and Beaker is a non-profit organization. Any surplus funds saved from one issue is used to improve the next.

This magazine is the chief contact between the textile industry and Clemson's textile school students, since it has articles on both, articles which are prepared by both industry and students as well. Any company which has any speeches, articles, or other information that may be of interest to our readers may submit such material to the editor. The views and opinions expressed in articles in the Bobbin and Beaker are not necessarily those of the staff or the textile school. All sides of any subject are presented as fairly as possible.

The Bobbin and Beaker staff is open to all suggestions or criticisms and will appreciate any letters of such nature on your part. It is our goal to present to you, our reader, the type of magazine that you would best like and profit by. Also any support by any of the textile industry in the way of advertisements will certainly be of great help.

We, the members of the present staff, feel that the former staffs have published excellent magazines. We feel especially honored to have been chosen to follow those who have performed so superbly in the past and only hope that we can follow at least "afar off."

SAFETY!

GENERAL SAFETY SUGGESTIONS

1. Report all injuries to your foreman at once regardless of how slight. Small cuts and scratches may become infected and should have first aid treatment immediately.

2. Report all unguarded machines or unsafe or unsanitary conditions to your foreman.

3. Help keep plant clean by keeping paper and trash off the floors and putting all empty cartons and paper cups in trash cans.

4. Take time to pick up objects you find on the floor which might cause you or someone else to fall.

5. Watch for oily or wet spots on the floors and pay particular attention to "Wet Floor" signs.

6. Walk—do not run. This applies especially to those pushing boxes or trucks.

7. Scuffling, horse-play or practical jokes are childish and have no place in an industrial plant.

8. Compressed air is dangerous and should not be used for blowing off clothes.

9. Loose or "baggy" clothing should not be worn around machinery.

10. Wear safety shoes or shoes heavy enough to protect your feet.

11. On account of the fire hazard, smoking is allowed only in lunch rooms and certain offices.

12. Use of chewing tobacco or snuff is unsanitary and is not permitted anywhere in the plant. Do not spit on floor, machinery or in drinking fountains.

13. Get help in lifting heavy objects and always lift with your legs instead of your back.

14. Always use goggles when operating emery wheels or where dirt or lint is likely to get in eyes.

15. Do not carry open knives or sharp instruments in your pockets unless protected by holsters.

16. Do not attempt to fix anything of an electrical nature unless it is part of your job.

17. Be careful in using ladders. Report them if out of fix, and return them to proper place when not in use.

18. Do not remove gear covers of guards while machinery is in motion unless instructed to do so, and then see that everyone is in the clear.

19. Never attempt to stop a machine by grabbing a belt or using any part of the body as a brake.

20. If you must shift a belt by hand, always use the palm with the thumb and forefinger extended.

21. Use only tools that are properly sharpened and in good condition.

22. Never use a wrench or other makeshift as a hammer.

23. When repairing machinery, do not scatter tools or extra parts on the floor.

24. Keep your work bench clean and see that everything is in its place.

25. Remove all projecting nails from barrels, boxes and other places where they might cause an accident. Notify your foreman of any boxes or bins that need repairing.

SPECIAL DEPARTMENTAL SAFETY SUGGESTIONS

Carding:

1. When cutting bale ties, keep face as far from bale as possible. Also, keep others away from cutting ties.

2. Be careful to remove all ties and tie buckles from floor.

3. Keep cleaning rags or waste away from high speed beater or fan shafts.

4. Never raise beater covers unless power is off and the beater locks are securely in place. Report any locks not working properly to your foreman.

5. Start new picker lap around lap pin with the palm of your hand; never use your fingers.

6. Use light stick to remove flyings from under Cards.

7. Be sure cylinder has stopped before opening stripping doors.

8. Do not place mop or brushes under Card.

9. When starting lap machine, keep your hands clear of wooden spool.

10. Do not cut off steel roll laps. Get section man to do this.

Spinning:

1. Never stand top cleaner board on end when cleaning rollers; place on top of creel.

2. Do not wear long or loose hair around spinning frames. Use hair net if necessary.

Preparation:

1. In starting new beam on warpers, be very careful to avoid catching fingers between beam and drum.

2. Keep floor clean of starch, size and water around slashers.

3. Keep front delivery roll guard in position when slasher is running.

4. Always stack empty beams in a safe manner.

5. Be sure steam is cut off before raising size kettle lid, and then raise slowly to avoid hot size splashing on operator.

Weaving:

1. Never allow one person to push back shuttle and another to start loom at same time.

2. Fixer should have power turned off or shuttle out of loom before working under looms.

3. When replacing fuse in motor switch, be sure electric current is off.

4. Weavers should carry scissors for trimming broken ends off of cloth.

Cloth Room:

1. Keep cloth tubes in proper place.

2. Never try to stop folder blade as it travels toward you.

3. Keep folded cloth and rolls of cloth stacked neatly.

General:

1. Release clutch before shifting belts on all lathes and milling machines.

2. Clamp work securely in drill presses and milling machines. This is easier and safer than holding part with your hands.

3. Take lathe bits out of holder while placing heavy work between chuck or centers.

4. Only authorized persons are permitted to use rip saw or band saw.

5. Electricians should never do any work on electric circuits until current is cut off. Be certain to test line and place "Danger—Man on Line" sign at disconnected switch.

6. Do not jump fuses or heater relays.

7. Remember, no job is finished until materials is cleaned up, waste and rubbish placed in proper container, and tools are back in proper place.

E. I. du Pont de Nemours and Company Incorporated

The selling prices of Du Pont products on the average have dropped below the level of 1949 despite the rising tide of inflation.

The company said today this was made possible by the rising volume of sales and reduction in costs through technological improvements. Sales have doubled since 1949 and this year will go over two billion dollars for the first time.

"Had it not been for the inflation in almost everything we have to pay for, our prices could have been even lower," said Ira T. Ellis, chief economist of the company. "Even so, we have now been able to overcome most of the postwar inflation as far as our own prices are concerned."

Du Pont produces about 1,200 products and product lines so diversified that they go into every category of manufacturing in the nation, primarily as raw materials used by other industries largely for consumer products. Thus the prices of Du Pont produts have the effect of holding down prices all down the line.

Ten years ago Du Pont prices were on the way up along with everything else. Until 1951 they went up at about the same rate as prices generally. For the next two years the company was able to hold them almost even, and then, in 1954, it was able to start them down, a trend which has now brought its price level below 1949.

Statistically, Du Pont's index of selling prices was 104 in 1949 (the customary base of 1947-49 equaling 100). By 1951 it had risen to 112. Starting the downturn in 1954, it went to 105 in 1958. At the latest tabulation (for November 1959), it had declined to 103.4. The index represents a composite of the prices of the company's broad product lines, Mr. Ellis explained. Thus some products may be up when others are down.

Du Pont had its first billion dollar sales year in 1949. While sales have doubled since then, so have taxes, wages and salaries, and other major costs. During the same time, the company created about 12,000 new jobs, principally in the commercialization of new products.

The increasing physical volume of production was one of the major factors in the company's ability to bring down prices, Mr. Ellis said. "A larger sales volume usually produces lower unit costs, especially for newly developed products," he explained.

Coupled with this is the never-ending job of process improvement to make things better and at lower cost, he said. "In a highly competitive industry, Du Pont has sought operating economies just as tenaciously as it has scouted new and larger markets for both old and new products."

The results stem from the company's expanding technological improvements and from the larger operating investment in facilities, he explained. Since the war, the company has spent close to two billion dollars for new plant capacity, plant modernization, and laboratory and service facilities.

In contrast to Du Pont's declining price level, the consumer price index went up 13 per cent since 1951 and industrial products generally rose 11 per cent. Mr. Ellis pointed out that this rise in the cost of living was caused largely by the rise in prices of housing, food, public and private transportation, and medical care.

Earlier in the year, John F. Daley, a vice president and adviser on sales, said, "Some Du Pont price reductions were made to meet competition while others were made to widen markets, a development made possible by strong, continuous research programs and generous expenditures for new and improved manufacturing facilities. These expenditures enabled us to trim unit costs. We expect to continue these efforts with, we hope, favorable effects on our selling prices."

He cautioned that higher production costs cannot always be absorbed by technological improvements or greater output. "There are times when the pressure from costs overwhelms the advantages gained from process improvements and new technology. Then we can stay in a particular line only by raising prices to cover part of the increases."

Prices across the range of Du Pont products have been generally holding steady or declining slightly in recenty years. Of the older products, fibers, dyes, and petroleum chemicals generally are down, reflecting continuing process improvements and greater output. A typical nylon yarn, for example, sold for $2.70 a pound in 1954 and now is $2.30.

Most plastics and farm chemicals are among the major product groups holding steady. Prices of newer fibers have come down as technology has been improved, with some price reductions made to broaden markets. "Mylar" polyester film, titanium metal, and hyper-pure silicon are examples of newer products undergoing price cuts since start-up of commercial operations. The recently announced price cuts on "Teflon" FEP fluorocarbon film and "Teflon" TFE fluorocarbon resin also typify that situation.

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THE

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THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

from the Editor

This issue of the "Bobbin & Beaker" is the last prepared by the current staff. We hope our publication has been of much interest and use to the textile industry. The new staff will be headed by Tommy Ariail the present Managing Editor.

This issue features articles on textile chemistry and textile machinery. The Dean's column contains information on the short summer courses at Clemson for men of the textile industry.

The 1959-60 Bobbin and Beaker staff seated from left to right: Gordon Ferguson, Advertising Manager; Samuel H. Fleming, Circulation Manager; Charles Bagwell, Business Manager; Tommy Ariail, Managing Editor; standing, Alan Bell, Editor.

Spectrophotometric and Colorimetric Transmittance Determinations Of Dye Solutions

By: J. D. Turner
Technician Chemist, Development Section
Excelsior Finishing Plant

The use of color measuring instruments is becoming more common in our dyeing and finishing plants. One of the apparent reasons for their usage is that the determinations are carried out by using established procedures involving simple calculations and requiring no knowledge of the theory involved. The results are accurate, dependable, and reproducible.

There are many practical applications for the spectrophotometer and the colorimeter in a dye house. Some of the applications related to dyestuffs are (a) analysis of dye shipments for strength uniformity, (b) evaluation of new dyestuffs, and (c) determination of dye exhaustion rates.

In most cases the dyestuff as received at the plant is not pure but is diluted with a given amount of soluble material. Of course, if the amount of these diluents is varied between shipments, then the concentration of the dye will change. If the concentration of the new dye shipment varies, for instance, 15% from the previous shipments, it will affect the dye formulas that have been standardized to the concentration of previous shipments. For this reason it is necessary that we know the concentration of each dye shipment that arrives at the plant.

Dye stuff strength determinations are made in the following manner. Most color measuring instruments read from 0 to 100% transmittancy on a linear scale. To compare the relative strength of two identical dyes, one must obtain the transmittance reading at the maximum absorption point and then convert this value to optical density. The optical density is the logarithm of 1 over the transmittancy. For instance, if one solution transmits 40% and another 45%, the former will have an optical density of .39794 and the latter of .34674. Their strength would be in this ratio. In this case the first dyestuff would be 12.87% stronger than the latter. Thus a corresponding change will have to be made in the dyeing formula to compensate for the dye strength difference.

There are instances where a given dyestuff is sold by several manufacturers. In addition the strength of the dye may vary between these manufacturers. Therefore the dyestuff buyer is constantly seeking those dyes, which offer the most money value, maximum color value and performance at minimum cost.

In order to compare two dyes, a spectrophotometer curve must be made of each dye. A spectrophotometric or photometric curve is a plot of the percent reflectance or transmittance of a sample at various wavelengths. Daylight or ordinary artificial light is made up of all the colors of the spectrum. The visible spectrum begins at the ultraviolet region and runs through blue, green, yellow, orange, and red colors and ends at the infrared region. The visible spectrum does not have any very definite limits. However, it is generally assumed to extend through the wave length range from 400 to 700 millimicrons. Light of 400 millimicrons is blue and 700 millimicorns is red. A substance appears to be a certain color because it reflects or transmits color of that wavelengths. A red dye solution would transmit red light and absorb most of the other colors.

The curve shapes are independent of concentration; therefore two curves can easily be compared for shade by superimposing them. If the curves of two dyes can be superimposed, then they are identical colors and are said to be prototypes of each other. If two dyes are protypes, they may then be compared with regard to strength. No attempt should be made to compare two dye solutions for strength unless they are the same prototype and are chemically similar.

However, it has been pointed out that the analysis of dye in solution should be performed with care since the following variables may affect the results. First, there may be variations in dye performance due to difference in exhaustion between the dyes; second, there may be differences in dye selectivity

or ability to dye fibers evenly; third, there may be a slight shade difference within commercial tolerance which, nevertheless, might be interpreted as a strength difference; and fourth, dyes compounded with different diluents may appear to differ in strength.

The rate at which dyes exhaust may be determined colorimetrically by taking samples of the dye bath at different intervals during the dyeing and determining the relative strength loss as discussed previously. In this work variables affecting dye exhaustion such as temperature, time, and pH must be controlled.

Conditioning of dye samples is very important when conducting quantitative tests. Care must be taken to be sure the dye solutions are stable. Dyes may be sensitive to conditions which if ignored will lead to incorrect results. Some of the most important factors to be considered are as follows: (1) **pH.** Many dyes are sensitive to pH and consequently it is wise to buffer all dye solutions to the most stable pH. (2) **Trace metals in water.** Some dyes are very sensitive to small amounts of copper and iron; therefore distilled water should be used. (3) **Temperature.** Some dyes are temperature sensitive and should be controlled to $\pm 1°C$. (4) **Light.** Some dyes will change if exposed to light for long periods of time. Such dyes might be kept out of the light or irradiated by exposure to strong light for a short time. This condition will weaken the dye to a stable end point. (5) **Plating out on glass cells.** Some of the basic dyes tend to plate out on the instrument cells. Compensation can be made for this by plating the cells before the samples are run. Usually, only a small constant percentage of the dye will plate out. (6) **Time.** Some dyes change, usually weaken, if they are allowed to stand. Such dyes should be analyzed immediately after the solutions are prepared. In a few cases it has been found best to allow dye solutions to stand for a fixed time before analyzing to insure reproductible results. (7) **Sample size.** When preparing dye samples for solution analysis, sufficient amounts should be taken to insure that the sample is representative since most of the dyes are hetergeneously mixed with diluents.

There are only a few of the common applications of spectrophotometry and colorimetry and some of the factors to consider in their determinations. The spectrophotometer and colorimeter are recognized as useful tools in the textile industry. They have a very versatile applications and new uses are being discovered as progress continues.

CIBACRON DYES

Dyes Division
CIBA COMPANY, INC.

The impact of color on twentieth century living has been felt more keenly than at any other time in man's history. The use of color and its application to every day living has increased a hundredfold. Dye manufacturers are constantly striving for brighter dyes possessing greater fastness properties.

CIBA research has produced a range of dyes that at the same time achieve brilliance with greatly improved fastness. This range of dyes presents an entirely new departure in the dyeing of cellulosic fibers. The range is known as the

CIBACRON DYES

The Cibacron dyes show an improved appearance over previous dyes which were substantive to cellulosic fibers in that they are brilliant. They show a longer wear-life, that is, exceptional fastness because of a chemical linkage between the fiber and the dye. These two features set the Cibacron dyes apart from all previous dyes.

The Cibacron embody an entirely new chemical principle. They place the dyeing of cellulosic fibers on a completely new foundation. These dyes comprise a complete range of shades, applicable by dyeing or printing methods, which are simply applicable by conventional dyeing procedures for cellulosic fibers.

When conventional dyes are applied by the conventional procedures now used for cellulosic fibers, the dye is either absorbed on to the fiber or mechanically fixed to the fiber. Neither way yields a dyeing which exhibits optimum wash fastness. To obtain a dyeing with optimum wash fastness a dye must be available that is capable of forming a stable chemical bond with the fiber. The first attempts to synthesize such a dye were made over fifty years ago. Thirty years ago CIBA succeeded in synthesizing dyes which possessed suitable reactive groups. At this time there was no practical method to apply these dyes to the fiber. Then Imperial Chemical Industries developed their "Procion" dyes which can be fixed to the fiber by direct chemical linkage, and by a somewhat different approach CIBA produced the Cibacron dyes which form a chemical bond with the cellulosic fiber.

The Cibacron dyes are water soluble acid dyes with practically no affinity for cellulosic fibers. They contain a reactive group which combines with the hydroxyl groups of the cellulose molecule. The reactivity is such that in aqueous non-alkaline solution, the dyes remain unchanged for long periods of time. A chemical reaction with the fiber occurs only at high temperatures (160-212°F.) and in the presence of alkali.

The reaction with the fiber is accompanied by a side reaction in which the active group is inactivated in the presence of water and alkali. The portion of dye which is inactivated cannot react with the fiber and must be removed. This is readily done since the Cibacron dyes are highly soluble in water.

Since the Cibacron dyes are linked to the fiber permanently, they cannot be removed from the fiber by solvents, laundered off the fiber or rubbed off the fiber. Any dye so removed is removed together with the fiber. Although Cibacron dyeings possess very high fastness properties, they can be stripped for redyeing by treatments involving oxidation or reduction, or a combination of both. Should, for some reason, the finished dyeing not be on shade, it is possible to correct by shading.

It may be thought since the mechanics of dyeing for the Cibacron dyes is fundamentally different from that of all other dyes, that special dyeing equipment would be necessary for their application. This is not so—no special equipment is necessary. The conventional machinery found in any well equipped mill can be used. Pad dyeing equipment, batch dyeing and continuous dyeing equipment are particularly suited for the application of the Cibacrons. Modern piece-dyeing units require no modification.

Since, in the absence of electrolytes, Cibacrons have practically no affinity for cellulosic fibers they

*CIBACRONS—Registered Trade Mark by Ciba Company, Inc.

are ideal padding colors. Tailing, with such products is reduced to a minimum and any type padding mangle giving a uniform squeeze can be used. Immersion time can be increased for cloth with low absorbency.

The Cibacron dyes are essentially padding dyes and in addition to printing are applied by the Pad-jig method, the Pad-steam method, the Single-pad/steam method and the Pad-thermo-fixation method. The Pad-jig and Pad/thermo-fixation methods are generally used for small to medium sized batches whereas the Pad-steam methods are used primarily for larger batches. A short general description of these padding procedures will be given to familiarize the reader with the important features of each.

Pad-jig method

The material is padded through a padding liquor containing only dye. It is dried and passed into a jig containing the proper concentration and type of alkali. The material is given at least four ends over a period of at least 30 minutes. The loose color is removed with a hot rinse, soaped at the boil and then rinsed hot and cold.

Pad-steam method

The material is padded through a padding liquor containing only dye. It is dried and padded through a padding liquor containing caustic soda and common salt. Fixation is effected by steam for 30-60 seconds, followed by rinsing, soaping and rinsing.

Single-pad/steam method

This method differs essentially from the Pad-steam method in that the dye and chemicals are padded simultaneously and the steaming time is somewhat longer. The material is padded through a padding liquor containing dye and alkali. It is then dried and fixation effected by steam for 5-8 minutes. This step is followed by rinsing, soaping and rinsing.

Pad/thermo-fixation method

This method differs from the Pad-steam methods in that fixation is accomplished with dry heat rather than with steam. The material is padded through a padding liquor containing dye and alkali. It is then dried and thermo-fixed in dry heat for 5 minutes, at 320°F. The goods are then rinsed, soaped and rinsed.

In the field of printing a remarkable step forward has been achieved with the introduction of the Cibacron dyes. They lend themselves to conventional and emulsion methods of printing. The scope for printed patterns is now practically unlimited and because of the brightness and the high fastness of the Cibacron dyes, the printer is presented with a means of extending his range of available bright colors possessing outstanding fastness properties.

Compared with conventional methods of printing, the processes used in applying Cibacron dyes offer a number of advantages: 1. The preparation of the printing pastes is simple. 2. Cibacron printing pastes are stable almost indefinitely. 3. Prints produced with Cibacron dyes can be stored for indefinite periods without detriment, both before and after steaming. 4. Cibacron dyes are miscible with one another in all proportions. 5. Application of Cibacron dyes presents no difficulties in either roller or screen printing. 6. Cibacron dyes can be printed alongside dyes of all other classes (except where development is effected by an acid treatment). 7. Cibacron dyes can be used for discharge and resist printing.

Briefly stated the print paste contains dye, urea, thickener and alkali. The material is printed, dried, fixed with steam or dry heat, rinsed cold, rinsed hot, soaped at the boil, rinsed hot and rinsed cold.

In addition to the advantages which the Cibacron dyes offer over conventional printing, they have opened an entirely new concept in the field of printing—Trichromatic Printing. Extensive development work on these new dyes has led to the establishment of a new field in roller printing.

In the field of paper printing any original can be faithfully reproduced in color. In the field of textile printing it has not yet been possible, as a rule, to reproduce areas of graded color-tone or continuous-tone mixtures with conventional roller engravings. With Cibacron dyes and three rollers it is possible to produce a wide range of multi-colored objects. The field of paper printing uses as its primary colors a yellow, a red and a blue—in Trichromatic Printing on textiles there is no restriction on the primary shades used as components. Because of this, extremely attractive and well balanced color effects can be obtained.

Color separation of an original can now be transferred to three rollers by a process utilizing half-tone dot screens, color filters and cross line screens. In the sequential printing of the individual rollers on the textile material, the minute dots are not superimposed but placed closely side by side and so appear to the eye to merge into the original colored image. The Cibacron dyes possess special advantages, which make them especially suitable for printing from such tone-printing rollers and which make them distinctly superior to all other classes of dyes: 1 Cibacron dyes have good flow characteristics. 2. Even with consistent print pastes there is very little color transfer. 3. There is no clogging of engravings. 4. There is unlimited scope for mixture shades in fall-ons. 5. The colors are fully visible during printing. 6. The Cibacron dyes give good coverage and smooth

level tones. 7. Even the shallowest engravings and the finest half-tone grounds print with perfect clarity of mark.

It is essential that an emulsion thickener be used for Trichromatic Printing to ensure perfect clarity of mark from the shallowest etchings which, in turn, ensure strong, brilliant compound shades in uniform gradation of depth. Sodium alginate thickeners clog the finest parts of the engravings and make the mixtures appear rough and skittery because the minute dots cannot merge into one another.

Trichromatic Printing yields more attractive designs and brings patterns to life with the aid of even, dark and light tones. Mixtures of yellow, orange, brown and green tones with reds of a yellow and a blue cast or with blues of a green and red cast and with black, produce color contrasts never before achieved. Trichromatic Printing with Cibacron dyes is primarily suited to fashion styles, dress goods, blouse materials and squares.

The Cibacron dyes can also be package dyed, stock dyed and skein dyed.

Recent experiences have shown that the Cibacron dyes are not only applicable to cellulosic fibers but also to wool—by printing and by dyeing. After extensive laboratory experiments and plant trials CIBA has succeeded in developing a simple method of applying Cibracron dyes to wool.

Cibacron dyes on wool yield very fast, level dyeings of high tinctorial strength. Never before has it been possible to obtain wool dyeings which combine the brilliance and fastness of those prepared using Cibacrons.

Because of their brilliance and fastness the Cibacron series of dyes has found an extremely varied field of application. The following list includes just a few of the many end uses of Cibacron dyed material.

- Bright Fashion Shades on Cotton Pieces
- Terry Towelling
- Linen Fabrics Used for Furnishings and Clothing
- Corduroy
- Viscose Rayon Damask
- Bed Linen

Chemically fixed dyes are a significant departure from conventional dyeing as it has been known for hundreds of years. Dyestuff manufacturers will continue to find new applications for this type of dye, will continue to improve methods of application and will continue to add even more products to this range.

Technical Library Promotes Progress At Callaway Mills Company

A. U. Priester, Jr.
Executive Vice President
Callaway Mills Company
LaGrange, Georgia

"How many stripes has a Bengal tiger?
In what direction flows the Niger?
What knock-kneed actress was born in Duluth?
How many aches in an average tooth?
How many uses can paper show
Besides the kind that is used for 'dough'?
Would yarn to clothe children sliding down chutes
Wear longer than that in 'boot camp' boots?
Or coming to duck and garbardine,
Should the weaver of these be fat or lean?"

A technical library can't guarantee to answer all the above questions, but if instead of worrying about "tigers" and "teeth," you have a question concerning textiles, chemistry, or engineering, a technical library is a good place to begin looking for the answer.

It has been demonstrated over and over in the field of research that it saves both time and money to investigate what others have already done rather than take a chance of duplicating their work. One engineer recently was amazed to find that a "new idea" of his had already been patented in 1886. In all research the goal is knowledge—knowledge to use in solving problems. It matters little whether that knowledge is the result of research in the laboratory or in the library. If it can be found in the library, it is much less expensive. Realizing the wisdom of learn first what others have done, Callaway Mills Company organized its Technical Library in 1943 and since that time the scope of its services has continually broadened.

Callaway's Technical Library, located in the Research and Development Division, contains approximately 5000 volumes, as well as trade literature from various companies, a subject file of materials, a file of about 12,000 patents, and about 125 current periodicals. Indexes and card catalogs enable searchers to find what other people have already learned about the processing of nylon, the dyeing of Orlon, or whatever the specific problem may be. The library is staffed by a professional librarian and three assistants.

The library was enlarged and redecorated in 1958. The new area, which is almost half the size of the original library, provides additional space for shelving, files, card catalogs, and several tables and chairs. Varied colors — green, yellow, brown, persimmon, and gold — are used in the leather of the chairs. The window wall is a soft yellow, with cornice boards and the remaining walls a light green. Draperies in a modern design incorporate yellow, green, light blue, and gold on a white background. Plants, aquariums, and a large picture of lotus blossoms add to the attractiveness of the room. Air conditioning makes it comfortable.

Every company must have information materials. Pooling these resources in a centralized library eliminates wasteful duplication and makes the materials more readily available. Increasing use of the library is evident in the fact that in the last ten years, uses have multiplied more than 1800 per cent, many of the requests for information being made by phone. Some of the questions asked can be answered very quickly while others take hours of research. Subjects also cover a wide range. Here are a few selected at random from those handled by our Technical Library:

Specifications for hydraulic brake hose
Derivation and meaning of "pronto"
Construction of tobacco cloth
Methods of printing tufted carpets
An introduction to patent law
Employee testing programs
Comparison of tape recorders
Translation of a letter about a French loom
Information about textiles for a science project (from a school child in Texas)
Stainless steel versus other materials for dyeing equipment
Methods of identifying fibers and dyestuffs
Padding process for applying acrylonitrile
Accepted basis for measuring labor turnover
Staining technique for Gram negative bacteria

Cotton fever and its prevention
Information on titanium sponge
Bibliography on writing better business letters

In ancient times, it was possible for a man to master all the knowledge and be familiar with all the books of his age. In fact, even until three centuries ago a specialist could know all the significant books in his field and could read all the related journals. Today, however, with about 60 million pages of technical literature published annually, the only chance the scientist or engineer has to keep posted is by access to a good technical library.

Charles L. Bernier, associate editor of **Chemical Abstracts**, graphically describes the practical impossibility of the average businessman or specialist being able to read all that concerns his field of interest: "Today's scientific literature is so large, that one person can no longer read the output in one great branch of it, such as chemistry. If a chemist, who could read about 30 languages fluently, were to start reading in January all the papers of chemical interest which were published during that year, and if he were to read at the rate of four papers per hour and for forty hours per week, by the end of the first year, he would be more than ten years behind in his reading."

In addition to providing information for our scientists and engineers, we believe that all our executives need a broad background against which to make decisions. In order to keep all of these groups posted on current developments, our Technical Library prepares "Callaway Textile Abstracts" twice a month, each issue of which contains brief notes on some 150 magazine articles selected because of possible interest to Company personnel. This tailor-made abstract service is widely distributed within the Company not only to the offices and plants in Georgia but also to sales offices in New York and throughout the United States. Copies of complete articles are provided on request. The library also regularly routes periodicals to those wanting this service, as well as calling attention to items of possible interest. A weekly Patent Report is prepared by the library for the scientists and engineers.

No library can have all the information a company needs, but librarians cooperate by making available to each other through interlibrary loan whatever publications may be needed. Our Technical Library has been a member of the Special Libraries Association since 1943 and is affiliated with the Georgia Chapter and with the Paper and Textiles Section. The organization, which celebrated its 50th Anniversary in 1959, is composed of librarians of business, professional, governmental, and industrial organizations and now numbers over 5000 members in the United States, Canada, and many other countries. Cooperation among members enables each librarian to have at his finger tips information in fields other than his own. Some businessmen tend to carry over a childhood conception of a library as one that provides recreational reading for women and children—a far cry from the modern company library. A special library, whether large or small, is built around the needs of a special group of people, and the modern technical librarian believes in the motto of the Special Libraries Association, "Putting Knowledge to Work."

Studies show that companies that depend on their libraries for information tend to show greater profits than other companies. Even browsing can be time well spent, for often a reader will come across vital information he is not even aware existed. Or, he may read today what he will happen to need tomorrow. Special libraries may not have any "whodunits" so that you can help track down the murderer, but if it is technical or specialized information you need, a technical library is a good place to begin sleuthing. You might be the detective to track down a way to improve present methods.

According to Bacon, "Knowledge is power," but unused power does not lead to progress, any more than books on the shelf lead to improved company operations. For this reason we encourage the use of our Technical Library so that it can do its full share of "Putting Knowledge to Work."

Mechanical Doffer For Warper

By: Benny R. Phillips
T.M. Class of '60

Louie King, Weaving Technician, at the Clemson Textile School has devised a mechanical doffer for the Crocker Warper Model SD40. The original doffing arrangement was a hand crank operating through a worm and worm gear.

How it was Developed?

In the new mechanical doffer, power is obtained from a 1/3 horse-power, 550 volts, 1725 r.p.m. motor, equipped with a reversing switch. The r.p.m. to the worm is reduced to 84 r.p.m. by a "v" belt and pulleys. The reversing switch changes the direction of rotation for running or doffing.

The use of the belt drive makes it possible to operate the doffing arrangement without the use of limit switches as when the beam is at its extreme raised position. The belt connecting the pulleys slips preventing the motor from stalling. This slippage is made possible by the method of mounting the motor.

A motor mount was connected to the floor upon which the motor base was hinged on one side. On the other side a bolt was connected to the motor mount and placed through a hole in the motor base. A spring was placed on this bolt against the motor base and a nut was put on the bolt to hold the spring under tension. When the 15 inch pulley stops turning as the beam reaches the running position the motor pulley tries to climb the belt against the tension of the spring and the tension on the belt is lessened by the motor rising up, which allows the belt to slip on the motor pulley.

Advantage and Approximate Cost

The new doffing device is a great labor saving device because with it there is no strenuous work as previously involved with the turning of the hand crank for raising and lowering of the section beam.

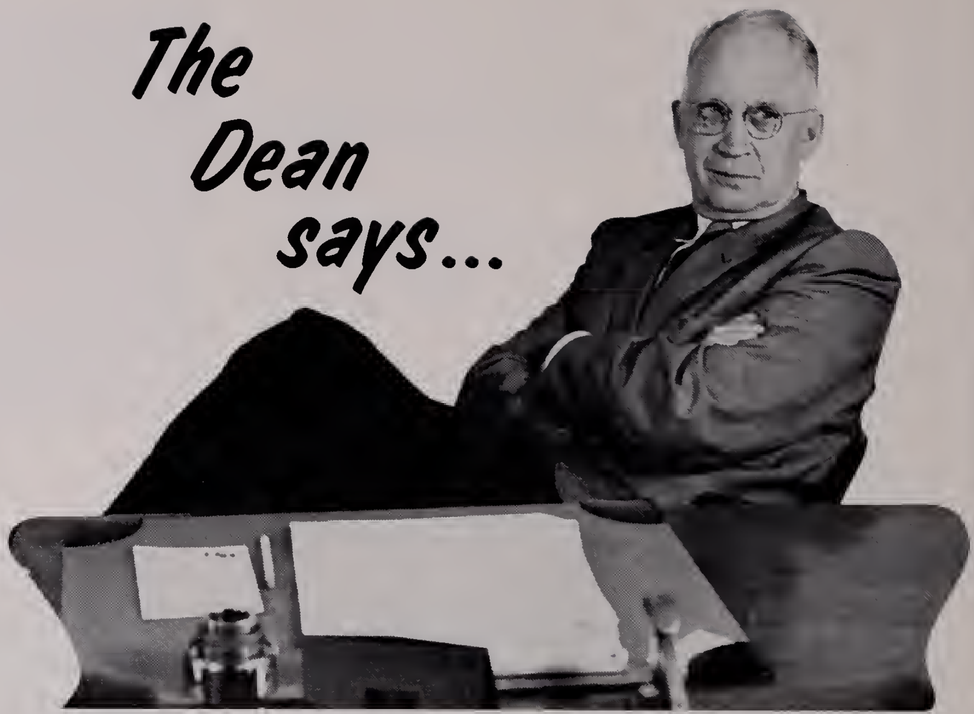
The approximate cost of installing this mechanical doffer, provided all parts have to be purchased new, would be about fifty dollars per warper, however, most mills probably have the needed supplies in their stock room, which are not being used.

Here Louie King is demonstrating the new mechanical doffer for the warper. (Photo by: B. R. P.)

Another Development

The installation of an off-on switch, connected to the three brakes, at the base of the warper so as to be foot operated enabled all brakes except the beam brake to be on. The beam brake being off enabled the beam to be turned at the front of the warper as previously needed. This device enables one man to insert the beam locking pins at the front of the warper without a second person to depress the beam brake.

The Dean says...



For the third summer the School of Textiles is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for for the college graduates, other than textile school graduates who will enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

Living. Those attending these courses can live in the college dormitories and eat in the college dining hall. If they live in the dormitories, they must furnish their own bed linen and towels. An electric fan would be desirable. Those who do not wish to live in the dormitories may make their own living arrangements. The Clemson House can accommodate those who wish to stay there. Some will wish to commute.

Length. Each course will last three weeks and will be a full time program. The lectures will be in the mornings and the afternoons will be occupied with laboratories or work in the library. If the need arises, courses will be repeated. There will be no classes on Friday afternoons or Saturday mornings.

Cost. The class fee is $75.00 for each course. This will include the text book. Room and board in the college dormitories will be $50.00 for each course.

Registration. It will be necessary to make advanced reservations for these classes. This is so that we may know for how many to prepare. Simply giving the applicant's name, course and sponsor will be sufficient. Payment may be made at the time of reporting. Checks should be made payable to The Clemson Agricultural College.

Time of Reporting. Students should report to the Dean's Office in the School of Textiles on the Monday morning that the course begins. If coming from a distance they may come in Sunday night. In that case they should report to the dormitory office and they will be taken care of for the night.

Entrance Requirements and Credits. There are no entrance examinations for any of these courses. A high school education is almost essential in all cases. There will be no college credit given for any of the courses. A certificate will be given each student who completes the course.

COURSES

Yarn Manufacturing—Theory and Laboratory—Date Offered—June 13, 1960

This course is especially designed for students of two backgrounds. One is the college graduate, other than a textile school graduate, who has selected textiles as a career. The other is the high school boy who has simply gotten a job in the mill and has attracted the attention of management. The course is organized to teach those things least apt to be learned on a training program or by experience. It is ideal preparation for a training program.

Fabric Development—Theory and Laboratory—Date Offered—July 11, 1960

This course is designed for the same type students as the Yarn Manufacturing course. Ideally, it should follow that course.

Supervisor Development — Theory — Date Offered—June 13, 1960

This course is designed to serve both supervisors and potential supervisors, including general overseers. The subject matter will be general, not confined to any one field of textile operations.

Quality Control—Theory—Date Offered—August 15, 1960

Due to the ever-increasing use of Quality Control in industry, this course is designed to fill the gap for those who are involved in Quality Control work, but who have little or no formal training in Quality Control.

Motion and Time Study—Theory and Laboratory—Date Offered—July 11, 1960

A Motion and Time Study Course designed to give both the basic motion and time study principles plus the more recent techniques such as Work Sampling, Methods, Time Measurement, etc. This course is directed towards motion and time study as applied to the textile industry and consists of both theory classes in the morning and laboratory experiments in the afternoon. The course is particularly suited to those who have entered the standards department recently without proper training in the field.

Cotton Classing—Date Offered—June 13, 1960

This course will basically consist of cotton classing by the accepted rules and standards. The students will go over a representative number of samples, followed by the instructor who will class the samples and explain points of difference.

The course will include lectures by personnel of the School of Textiles and others on cotton markets, harvesting and ginning questions, fiber quality as to character and related matters.

Outstanding Seniors . . .

CHARLES C. BAGWELL

Charles C. Bagwell is a Textile Engineering Major from Columbus, Ga. He has been an honor student at Clemson for four of the six semesters that he has attended school. He has spent three of his summers working in the textile industry. He has been employed by Muscogee Manufacturing Co., for these three summers.

Charles is in the Army ROTC where he is the company commander of company C-2. He is also a Hall Counselor, member of the N.T.M.S, Treasurer of the Phi Psi, and Business Manager of the Bobbin and Beaker.

Upon graduation from Clemson, Charles hopes to enroll in the Institute of Textile Technology, located in Charlottesville, Va. There he will further his education in the textile field, and upon graduation he will enter the textile industry.

FRANK McGUIRE

Frank McGuire is a Textile Management major from Laurinburg, N. C. He has spent two of his summers working with two different textile industries gaining a great deal of experience in textiles. In 1958 Frank spent the summer working for Morgan Cotton Mills, Inc., in Laurinburg. In 1959 he went into the training

program that Burlington provides for college students. He worked in the Pacific Mills plant located in Raeford, N. C.

Frank was an honor student the first semester of his junior year. He is an attorney for the Senior Council, Senior Warden of the Phi Psi, member of the N.T.M.S., and a member of the Clemson Tiger basketball team. Frank's ability to play basketball has earned him a full four-year scholarship. Frank is also a Cadet Lieutenant in the Army ROTC, and he will go in to the army upon graduation from Clemson.

DON FAILE

Don Faile is a Textile Manufacturing major from Kershaw, S. C. Don is single and lives in the dormitories here at Clemson. Don was an honor student his fifth and sixth semesters here at Clemson. He has spent two summers gaining valuable experience in the textile industry by working with Springs Cotton Mills.

Don is a member of the advanced Army ROTC program, member of the Phi Psi, member of the N.T.M.S., and also a member of the SAM.

This year Don was the recipient of the David Jennings Memorial Scholarship. Don plans to enter the textile industry as soon as he can fulfill his military obligation.

Loom Reeds Now and Then

By
S. Fuller McLane, Sr., General Manager
Southern Loom-Reed Mfg. Co., Inc.
Gaffney, South Carolina

Did you know:

A Textile is a woven fabric. The name comes from the Latin word texere, meaning to weave.

The oldest traces of weaving ever found are bits of flax and flax yarn in the remains of the Swiss lake dwellings during the New Stone Age.

The earliest actual textiles found in the tombs of ancient Egypt were of linen cloth. Mummy cloth dating from 2500 B. C. contained 540 warp threads to the inch. Mummy cloths discovered measured five feet wide and sixty feet long. Egyptians were highly skilled weavers as long ago as 4,000 years before Christ.

Cotton was known in India as early as 800 B. C. The Egyptians were weaving cloth of cotton before that period. Cotton, however, did not become commercially important until the time of Christ.

Through the centuries the development of reeds, essential for weaving cloth, has been instrumental in the progress of the textile industry. Southern Loom-Reed is the proud possessor of a hand-made reed which is over one hundred and fifty years old. The construction of this reed is similar to the present day pitch-band type reed. Instead of wire to form the dents they used small splits of reed (cane) cut out and smoothed for this purpose, thus the names reeds and splits, which are used to-day.

Although the reed industry of America is considered modern to-day, it seems that we are still rather new in the business.

We would like for you to take a written tour through our plant to better understand the procedure involved in present day reed making. We have been in business thirty-five years, producing various products for use in all types of textile plants.

Loom reeds being our foremost product we have naturally spent years of study and research in methods for better construction and finish for our trade name REAL REEDS in both pitch band and all metal.

Nothing but the highest grades of materials obtainable is purchased for Real Reeds. The main item is a special round wire for reeds. Many sizes of wire are required to maintain the desired thickness and widths after the wire is rolled. Each piece of wire is rolled from five to eight times through water cooled rolls. This cooling system is used to keep the rolls at an even temperature so they will not heat and expand. Expansion would cause the wire to vary in thickness. By use of this method we are able to hold the correct gauge to plus or minus .0001".

After rolling the wire, it is now ready to be placed on special built wire polishing frames where the wire passes through various tools designed and made in our plant for our exclusive use. There are no set rules as to how many times the wire is run through the various processes. This wire remains on the frames until the desired finish is obtained. The tools are used in the following sequence: a flat straightener is used to straighten the wire flat-wise, an edge straightener is used to straighten the wire edge-wise, special carbide cutters are used on the edges of the wire to obtain a smooth edge and to correct width, and at this point the wire is left with perfectly square edges. A concave gouge tool is now used in putting the edges of the wire back into a round shape again. Next the wire is placed in a special filing block, passing through a series of twenty files, ten of right hand cut and ten of left hand cut. In this tool the wire at first runs lying flat and then is turned at various angles so that when it is finished in the files the edges are smooth and round. The final finished polish is done in the emery board, where a fine emery cloth is set to contact the wire at every angle as well as the flat surface of the wire. It is then thoroughly cleaned, wound on pressed steel rims ,and placed in storage for future use.

The following widths of finished wire are stocked by us at all times: .105, .125, .150, .175, .250, .312, .375,

(Continued on page 19)

RESEARCH DEVELOPMENT PROGRAMS

By: Sydney M. Cone, Jr.

We have been interested in the efforts that are going on to expand research and make it more effective in our industry. It might be of interest to your readers to attempt to survey the various programs now going on under the general title of "Research". The government programs slanted toward textiles would begin with the Department of Agriculture programs. These are stimulated by the Department's interest in the cotton crop. They extend to by-products of cotton. The off-shore program managed from Rome, Italy involves technical research in the countries of Finland, England, France, Spain, Italy and Israel. This uses their facilities and their currency. The government-sponsored research extends all the way from the cotton plant to the Atomic Energy Commission's interest in the effect of radiation on fibers.

Private research facilities, privately owned and with the profit motive, have been able to merchandise many profitable programs to government and to industry. Joint projects, such as the Textile Research Institute at Princeton, New Jersey and the Institute of Textile Technology at Charlottesville, Virginia are supported by private companies, but not for profit. Their programs are aimed at very specific technical problems of their memberships. The big business corporations maintain private research facilities for profit. Some of these are more successful. Sometimes you start with a consumer need, and sometimes you have to use promotion methods to persuade the consumer of his need. The corporation research must be backed by a willingness to spend money on plant and machinery in order to cash the products of the researcher.

Tying together in a very loose way these various unrelated efforts, you will find the personnel that is involved in the laboratories, the manufacturing, and the merchandising. This personnel takes memberships in the American Chemical Society, in the American Association of Textile Chemists and Colorists, American Society Quality Control, and an assortment of similar groups. Technical seminars, social meetings, publications and visits keep these individuals in touch with each other and with the general flow of knowledge in their specialties.

It is easy for the expert to get lost in this maze. From time to time, study committees are set up to attempt to bring more order into an apparent chaos. These research efforts and organizations have been growing right fast and sometimes they outgrow the organizational pattern that was suitable for the smaller group and less suitable for the larger one. Their interests expand. Textile companies have now to evaluate the word "Nonwoven". Will Nonwovens bridge the gap between the paper mill and the loom? Will extruded threads eliminate the spinning frame? The technical knowledge of the spinner may have to be expanded to a new dimension.

It is an interesting study to try to fit together the research components and to see where they have their own fields of study and interest, and to what extent each research program overlaps the program of another.

After a certain degree of knowledge of the entire research picture has been achieved, the student of this picture could sit down and lay out an effective research organization for a particular mill or manufacturing corporation. The problems to be submitted to the research organization would exclude the day-by-day technical production control. It would include special problems that production might encounter. The student would want to give consideration to such questions as:

1. How far beyond special problems do you want your research team to probe? Do you want it to create new products?
2. How do you propose to finance the operation? The method of financing will have an effect on the freedom of action of the research executives.
3. Are you going to maintain a patent and licensing service?
4. Are you going to use some existing facilities outside your company to attack special problems for you? This is especially necessary when expensive equipment is needed for the particular study.
5. What educational and training facilities will your research group attempt to supply to your company?
6. Will your research group undertake to maintain membership and attendance in national societies, technical schools, libraries?

7. What specific facilities are you going to need to develop your research program? What laboratories? What Pilot Plants? What testing apparatus?
8. How are you going to evaluate the production of the research group?
9. You will need to have a close correlation with production and with merchandising, and the method of establishing this correlation is another study in itself.

Now that the word "Research" is on everybody's lips, it behooves the student to define the word in understandable terms. This little essay is such an attempt. It has tried to provide some perspective and to indicate areas that the student might well investigate further.

LOOM REEDS

(Continued from page 17)

.500, .625, and .750". All of these widths are in various gauges as to thickness so as to get the correct amount of air space in any dent per inch reed. The shape of this wire is both oval and semi-oval. It is also in both carbon and tempered stock for reeds that require wire of this type.

A smooth high grade yarn is used based on 30's single knitting twist. A certain number of ends are twisted together according to the dents per inch in the reed to be made. A special mixture of tar and pitch is combined and heated in a steam jacket pot to correct temperature. The use of steam by us is to prevent any chance of burning the mixture in which the band is being impregnated.

We are now ready for the finished wire and band to go to the reed setting machine along with the bass wood ribs which form the frame of reed. Since the actual operation and setting of the reed machine would be rather complicated to explain in writing, we will give you only one feature which we have proven is better in it's use on this machine. It is necessary to have heat on the reed machines to soften the tar and pitch treated band as it wraps around the ribs and between the dents. An open type gas burner is the conventional type heat used. Thirty years ago we developed an electric heating arrangement for this purpose giving more uniform heat and a smoother set reed.

After the reeds are made they first go through a very rigid inspection for flaws of any nature. The caps and headings are now put on, the headings of a reed are of utmost importance, and for that reason we have developed two different type end bars, both of which give additional strength to the reeds along with several other features. One type of these end bars has been on the market for fifteen years. After several years of testing, our latest type was put into use in 1958, the feature of this one being that the outer edge of the end bars is beveled allowing the shuttle to make a smoother and more uniform contact on the reed when the shuttle is picked from the box, causing less wear on both the shuttle and the reed. After the caps and headings are put on, then the comb of the reed is clinched down smooth.

The reeds are now ready for the finishers. Their job is to see that the dents of the reed are straight, level, and uniformly spaced. The reed is then passed on to a hand polishing process. All Real Reeds are finished as to polish and not ground with an emery belt after they are made. The hand polishing is an added cost to us, but it assures the customer of a smoother reed for both warp and shuttle.

The reed is now ready for the paper or mystic tape to be glued on the backs of the reed. If paper is used, the reeds are placed in a drying cabinet to set the special type glue that we use.

The reeds are thoroughly cleaned and brushed with a series of nylon bristle brushes. A final inspection is made before they are packed for shipment.

We are questioned quite often as to what dent reed is used by most mills on certain constructions. It might be of interest to know what a wide variety of specifications we have made reeds by over the past years, taking an 80 X 80 construction as an example. The following is a range of dents per inch used in the various reeds for this:

36.96 dents per inch, 37.04 dents per inch, 37.18 dents per inch, 37.20 dents per inch, 37.27 dents per inch, 37.30 dents per inch, 37.40 dents per inch, 37.50 dents per inch, also on up to 38.00 dents per inch. Also a range of sizes of wire used .010, .011, .012, .0125 in thickness, and .105, .125 and .150 in wire widths. A similar variation applies to most all constructions. So there is certainly no such thing as a standard for any one style.

WILDMAN JACQUARD "HI-PILE" KNITTING MACHINE

The Wildman Jacquard "Hi-Pile" knitting machines have been in existence for a number of years with the main production emphasis on "imitation fur" fabrics. Many mill people fail to realize that these machines produce salable fabrics other than "imitation furs." In addition to the many forms of innerlinings for outerwear garments and shoes there are paint rollers, buffing cloths, toy coverings, rugs, mats, carpeting, and decorator fabrics, to mention only a few of the many end uses for this versatile fabric. However the fabric that has been most neglected in recent years has been "Hi-Pile" fabric itself. Not "imitation fur" but rather a tastefully styled reasonably priced "Hi-Pile" outerwear or decorator fabric in a rainbow range of colors that has the creativeness and the practical qualities to attract the consumers.

Recently the Wildman Jacquard Company has developed an automatic two color mechanism for use on their "Hi-Pile" knitting machines which enables the knitter to produce any number of horizontal stripes of different colors in any desired width of stripe. In combination with this striping mechanism "trick" wheels may be used to produce various vertical patterns at the same time or separately as required. A control chain with high and low links may be set up to change colors as desired. The trick wheels may also be set up to select as many or as few needles as is required to obtain the desired color pattern effect. This is a relatively new development in the High Pile field and not too much has been done up to the present in marketing mixed colors or color patterned "Hi Pile" fabrics. This of course leaves the field wide open for creative designing of new "Hi Pile" fabrics with added consumer appeal.

Knit pile fabrics offer many advantages over other forms of pile fabrics and give the designed a decided freedom when considering "new" fabrics. First a real dollars and cents saving of raw material (i.e. card sliver as opposed to the more expensive yarn) for the economy minded firms. Secondly, a deeper, denser, pile with the superior draping qualities that are necessary to avoid the "too bulky" look so unflattering to most consumers. The Wildman Jacquard Co., uses a directed air stream to assist the card doffer roll to place the sliver staple in a "U" around each needle. This method forces the staple to the face side of the "pile" (preventing the unnecessary knitting in of the staple with the backing yarn) and allows the backing yarn to firmly anchor the staple at the bottom of the "U". This method prevents the backing from becoming bulky and at the same time provides maximum pile coverage on the face of the fabric. Thirdly, the comparatively (for the same end use) lighter weight of the finished fabric.

In order to improve the operation of their "Hi Pile" knitting machine, the Wildman Jacquard Co. have recently developed a new low pressure air system which can be used with their machines eliminating the necessity for the mill owner to supply an outside high pressure air supply. This new low pressure system has several advantages over the high pressure system in that it supplies much cleaner air without the oil and water condensation usually found in high pressure systems. It also is much quieter in operation and cheaper to maintain, providing a worthwhile over-all savings in air supply costs.

By careful selection of the sliver staple length (i.e from 3/4" to 3 " length for synthetic fibers and from 3/4" to 6" for natural fibers) real economy can be realized in the shearing operations. In addition to the savings, the designer is left free to create effects by mixing long and short staple lengths and/or mixed color staple in the sliver. He can also select sliver weights from 50 to 300 grains per yard and fiber from 1 1/2 to 15 denier. By mixing the denier of the fiber various effects can be obtained or by mixing synthetic fibers of different shrinkage qualities still other fabric effects can be produced. Heavier and lighter type fabric backing can be made by choosing the cut or number of needles in the machine (from 6 cut to 16 cut) or by varying the count of the backing yarn.

The backing yarns used would depend on the end use of the finished fabric and the method used in finishing. The type of backing yarn used also depends on the methods used in setting the fabric. Where heat setting is used a dynel type of yarn is used to take advantage of the shrink characteristic. Where latex is used, a cheaper cotton yarn is satisfactory. Various other color effects in the finished fabric have also been produced by mixing natural (i.e undyed) fibers with different dye absorption rates. All of these possibilities have been tried at various times but the vast end use potential of these new and different fabrics has been barely touched.

Most all synthetic Hi Pile fabrics are resistant to stains and in addition, they give excellent wearing qualities and are moth proof. All of these features have a built-in consumer sales appeal to help the designer and the mill owner create "Hi Pile" fabrics of beauty, utility and salability.

The Market Potential For Polyolefin Fibers

Victor L. Erlich
Reeves Brothers, Inc.

Among the new textile fibers, this group is the newest one at present and you probably have guessed what I am writing about; I mean the Polyolefins or "Olefins" as recently designated by the Federal Trade Commission.

It was reasonable—I think—not to put the polyolefins on the same level with the Polyamids, Acrylics and Polyesters. The latter have been introduced twenty or ten years ago and all of them have found their fields of application specifically or in competition with each other, and this in the order of magnitude of hundreds of millions of pounds per year. Therefore ample experience exists for extra-polation into the further development of their respective markets.

Not so for the Polyolefins or—for the time being—more specifically for the Polypropylene fibers. The term polyolefins comprises the commercial older and new types of polyethylene, and polypropylene. Other polyolefins are still laboratory curiosities, but one or the other may emerge ready for the industry.

Polyethylene in form of filaments has been used in small quantities for about ten years. When the new linear polyethylene was offered by 1957, it became possible to manufacture filaments which in strength were comparable to nylon; and in 1958 polypropylene made its appearance as a competitor. These fibers were produced in the form of comparatively heavy monofilaments which established their market primarily for strong ropes and for a variety of industrial fabrics, woven or braided. Such filaments in their diameter range of between 20 down to say 5 thousandths of an inch or in denier from 2,000 to not much less than 150 are much too stiff to serve as a textile material, in the broad sense. Many industrial applications require soft and pliable fabrics, and if we venture into the garment field the denier of the fiber does not exceed 20 but normally ranges around 3, 2 and 1 denier. This means the diameter of the individual fiber will be below 2 thousandths of an inch, used in form of multifilament or spun yarn.

Methods of production as well as of commercial application of these fine fibers are clearly distinct from those of the heavy polyolefin filaments. The latter are already established in their market with a yearly consumption of between one and two million pounds per year; an increase by several more millions can be expected particularly if polypropylene can widen its foothold especially in the seat cover field. Such quantities, however, remain rather insignificant in the light of a yearly production capacity in U. S. which may reach 2 billion pounds of polyolefin polymers in the next years.

Fine Fibers of Polypropylene are just emerging from the first production lines and sizable quantities of these fibers will become available during 1960 from several sources here and abroad (Italy, England, Germany, perhaps France). As per today, production figures up to ten million pounds per year have been announced for these fibers but quite some time will be needed to have an actual response of the market. Therefore it is still premature to make predictions even with regard to the order of magnitude of either tens or of hundreds of millions of pounds.

There is no doubt that the fine polypropylene fibers will find their place in certain applications especially industrial ones where such a fiber has advantages in view of chemical and other properties. This has been discussed in papers published in "Modern Textiles Magazine", November 1958, and another one published this month in Textile Research Journal.

Essentially it can be said that the polypropylene fiber ranges among the high tenacity fiber. It has good resilience, this means it is a lively fiber, which can be processed on regular textile machinery as such and in blends with others, natural or synthetics. The softening point, this means the upper temperature limit for practical application is lower than that of nylon or Dacron but better than that of polyethylene or vinyls, this may not be a serious handicap even for apparel use, because every housewife is now-a-days acquainted with low temperature ironing of the "no ironing" label. On the other hand, it is now established that well processed fibers can be exposed to temperatures as low as —°70C (—94°) without damage. Dyeability and outdoor weather resistance of the fine fibers were and are other problems of experimental work for which good progress can be reported. Continuing development on the en-

Paper presented before the "Chemical Market Research Association", Williamsburg, Va., September 22, 1959.

tire front including the structure of the polymer itself is so to say unavoidable in view of the work done not only by those who are already in the polypropylene field but also by many others who are just playing with the idea.

Adjusting the properties of a new fiber to the enduses is the pre-condition which determines the scope of its future market, this means whether this market will remain limited or become a broad one. But what finally throws the balance, is the economic position, with other words, the **cost and subsequently the market price of the new fiber** in comparison with the established ones.

Cost of production from the polymer to the fiber, is about the same for any type of full synthetic fiber when compared under similar conditions of production to either staple or multifilament yarn. Differential cost of the fiber depends therefore on that of the polymer and its specific gravity which determines the yield of fiber per pound of resin.

In our case the basic raw materials are the simplest olefins, ethylene or propylene, which are supplied from the refineries of natural or cracked petroleum gas. They are the building stones of the tremendous petrochemical industry which accounts now for approximately one third of the total chemical output and perhaps three fourths of the synthetic organic chemicals in U. S. Purified ethylene ranges in cost between 2½ and 4¢ per pound; propylene may be somewhat higher in cost, in U. S., or lower, in Europe, depending on location and accounting-system of the refinery. The ratio of propylene to ethylene to be obtained also can be controlled, at least to a certain degree.

Their straight polymers, polyethylene or polypropylene, should therefore be the most economical ones to produce, on paper at least. Indeed when polypropylene will be in firmly established and competitive full production, the price of this resin should come down from its present level of 42¢ to that of polyethylene, this means to 35¢ and less, perhaps to 30¢. Such level will be below that of most or all of the fiber-forming synthetic polymers, and will be hard to beat.

On top of this, the specific gravity of:

0.90 to 0.91 for the polypropylene fiber compares with
1.14 for nylons 6/6 and 6
1.14 to 1.19 for Acrylics
1.22 to 1.38 for Polyesters

and the yields per pound of the same size of yarn are in accordance between 20 and 35% better than for the synthetics established in the textile field. This would assure a good competitive position even on the same Dollar per Pound basis.

This being established, **what could be the broad market** potentials, this means the jump from a ten million to the hundred million level per year? Obviously this can be expected only if the textile industry including the garment manufacturers will have an interest to use the polyolefin fiber for certain of their lines.

As a full synthetic fiber, polypropylene will have to be accepted as such, not necessarily in competition but in addition to those which exist, and such a place is wide open indeed.

In the overall textile fiber picture, we have to distinguish the positions in U. S. and those outside.

While we have a total per capita consumption of 35 lbs. per year, only 8 pounds are an average for the world outside which includes Canada and those Western European and a few other nations which have a per capita consumption of between 20 and 30 lbs.

In the States approximately 3 to 3¼ lbs. full synthetics are now consumed per capita and year, or approximately 9% of the total fiber use. These very last years have shown that the natural fibers, cotton in particular, and the broadening group of the regenerated cellulosic fibers are putting up a hard and not unsuccessful fight against the inroad of the synthetics. Actually the synthetics had quite a beneficial effect on the older fibers which show that they can improve their properties while maintaining their popularity of thousands of years. But both are learning how to live together, and therefore the synthetics will grow proportionately and with the growth of the population. This growth alone adds a requirement of about 100 million of total fibers per year.

Outside U. S. and quite particularly for the so-called under-developed countries, the increase in the per capita consumption will present a greater challenge to the textile supply than the growth of the population. In the long run, it will become more and more difficult for the natural fibers, cotton and wool, to meet this challenge. At present they cover approximately 80% of the world total fiber requirement of 30 billion pounds per year, and an increase of only one pound per capita means an additional need of 3 billion pounds per year against half a billion due to the yearly increase of the world population at the present per capita consumption. Consequently a steadily increasing portion of these additions will have to fall in the lap of the man-made fiber industry, first of the regenerated cellulosics and then more and more of the full synthetics. Considering that these synthetics now supply less than half a billion or say 0.2 lbs. per capita outside U. S. against the three lbs. in U. S. we see the disproportion and the conclusion to be drawn.

This obviously will be to the benefit of the entire

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ALLIED CHEMICAL POINTED THE WAY TO TEXTURED FILAMENT NYLON IN HOME FURNISHINGS

The big breakthrough in the evolvement of carpets made of textured filament nylon came in 1958 when a lone carpet manufacturer quietly showed an experimental cut-pile number to a few knowing retailers and distributors at the June market. The significance of the new development may be measured by the fact that eight textured filament nylon qualities were offered to retailers and distributors by no less than four important carpet makers at the January market in 1959.

From the beginning, Allied Chemical's textile experts were intrigued with the idea that pre-shaped filament nylon might well result in a completely new kind of floor covering which could set standards of performance never before obtained by the industry. The advantage of using a filament nylon over a spun nylon in carpeting, Allied Chemical experts realized, was the elimination of pilling and fiber migration, long a problem in nylon carpets due to the strength of the nylon yarn. If a filament nylon could be used in the place of spun nylon in carpets, upholstery—and other fabrics where pilling and fiber migration became a problem—it might be possible to open up a whole new field in carpet styling, backed by superb performance.

Allied Chemical took the first step in 1955 when it successfully introduced a completely new class of durable textile materials called Caprolan heavy yarns. Large supply packages, a parallel arrangement of liaments ,a degree of dyeability not previously attained in high tenacity nylon and a ready degree of workability with heat provided a yarn that was ideal for texturization and for use in all kinds of home furnishings fabrics.

Since that time Allied has maintained a persistent program of cooperation and guided exploration designed to induce texturizers and textile manufacturers to unleash their imaginations and captialize upon the limitless potentials made possible in the home furnishings field by the inherent properties of Caprolan heavy yarns.

Allied, in order to assist its customers, wholeheartedly offered the resources of its new Fiber Application Laboratory, opened two years ago adjacent to the Caprolan spinning plant near Hopewell, Va. The know-how of its end-use development staff as well as its fiber application specialists was made available to firms interested in originating texturing developments.

Carpet firms particularly realized the potentials of textured filament yarns and initiated long range schedules of experiments based on this new concept. The first notable success was the commercial production and introduction of Croft Carpet Mills' "Resort" collection of carpets made with Textured Caprolan pile yarns based on multi-process yarns developed by Leon-Ferenbach Company. The pile yarns, which incorporate more than one type of texturization in a single Caprolan yarn, offered a new degree of bloom and cover in carpet yarn and made it possible for Croft to create a significantly new type of cut-pile texture which was easier to clean, unsurpassed for resilience, unexcelled for wear and would not shed, pill or fuzz.

This new and different kind of functional carpet was introduced to the public in the Fall of 1958 by such leading retailers as W. & J. Sloane of New York, Rich's of Atlanta, Miami Rug Company of Miami, Marshall Field & Company of Chicago, Jerry Miller Carpets, Inc., of Indianapolis, Suniland Furniture Company of Houston, Meier & Frank Company of Portland, Oregon, Zandt Carpet Company of Hollywood, and Rounds of Pasadena.

Allied Chemical has instituted a "Certification of

Performance" program by which carpets may qualify for marketing under the "Textured Caprolan" label. Basically, the program approaches the carpet on the basis of what it will do for the consumer. Furniture marks must disappear, colors must meet strict minimum standards, texture must be retained after traffic and after professional cleaning, the fiber must not shed, and soil and stains must easily removed by simple procedures.

Carpets of Textured Caprolan not only perform well but are of significantly greater value than carpets of other fibers offered in the same range. The excellent resilience and covering power of Textured Caprolan make it unnecessary for the manufacturer to overload his product with pile yarns in order to achieve satisfactory performance levels. Experience has already indicated to carpet manufacturers a new high level of manufacturing efficiency with machines operating well over 90% of shift time.

Spurred by the joint achievement of Allied Chemical, Leon-Ferenbach and Croft, other fiber manufacturers have accelerated programs to introduce textured filament nylons of their own. In addition, practically all yarn preparation mills are developing texturization techniques of their own—as are a number of fabric manufacturers. The opportunity for new products in closely connected fields, such as upholstery and draperies, already has been exploited. For example, Collins & Aikman have successfully marketed two highly acceptable uphostery fabrics of Textured Caprolan. In addition, other types of textured nylon have been developed for use in transportation fabrics.

There has been some adaptation of textured yarns in industrial fabrics also. Some work has been successfully completed on the development of rope for use in mooring dirigibles. In addition, shoe threads have proved to be a successful application of Textured Caprolan yarns.

The textile industry also is utilizing untextured Caprolan heavy yarns in such end-uses as upholstery; cordage, both laid and braided; shoe thread—much of which is hot-stretched and/or bonded; fire hose; and webbings.

Allied's pioneering program — in conjunction with independent texturizers and fabric manufacturers—has done much to stimulate the industry and encourage technologists to develop their own ideas for the texturization of Caprolan heavy yarns and for their application in a variety of experimental fabrics. The reception of Textured Caprolan yarns by carpet manufacturers in the Winter markets of 1959 and the greatly increased effort by yarn processors, other fiber producers and fabric manufacturers, is a small but significant indication of what these new materials hold for the future.

POLYOLEFIN FIBERS

(Continued from page 22)

synthetic fiber industry, but it also is an illustration for the margin which is available for a new fiber which is able to fill at least certain sections of the market and which can be supplied at comparatively low price. Practical experience is much too limited today to permit predictions but in our mind this is the case for the polypropylene fiber and perhaps even more so for its future industrial relatives. Such relatives can be expected because the polyolefins are a classical example how to build chemical structures of fiber forming polymers with properties which can be adjusted tailor-made to meet the diversified requirements of the textile markets.

Optimism Hinges On Government Action

By

James A. Chapman
President of Inman Mills, Inman S. C.

Textile industry optimism hinging on possible government action on imports and other problems was voiced by the titular head of the industry.

James A. Chapman, president of Inman Mills at Inman, S. C., and president of the American Cotton Manufacturers Institute, representing the cotton, man-made fibers and silk segments of the industry, said:

"The year for textiles has been marked by improvement along several lines and the emergence of a growing awareness by our government of some of the many problems peculiar to the textile industry.

"Leadership of the industry as a whole is much more optimistic than a year ago, but whether this optimism is justified will depend on whether our government changes its policies regarding the textile industry, particularly as to imports and the two-price cotton system.

"Recently, President Eisenhower, acting on recommendation of Secretary of Agriculture Benson, directed the Tariff Commission to make an investigation of the imports of cotton textiles pursuant to Section 22 of the Agricultural Adjustment Act as amended. We expect this investigation to show that relief from imports is necessary for the continued health of our textile industry. Although the announcement of the investigation seems to have been directed specifically at the present system, whereby foreign

mills buy American cotton eight cents a pound cheaper than our mills can buy it, it is hoped the hearings will be broadened in scope to include the wage differential between our industry and the textile industries of other nations, as well as other factors. We intend to make a strong presentation at the hearing, scheduled to start March 1, with the hope that the entire imports problem can be examined and dealt with.

"In the past year, we have seen mill inventories decrease steadily, while unfilled orders increased; the price structure of the industry improved; production levels rose somewhat; overall employment in the textile industry increased and the profit position has improved, although textile profits this year were still only slightly over half the average of all manufacturing.

"We must remember that 1958 was a very bad year and we had nowhere to go but go up, and the American Textile industry still is below the levels of 1952 and 1953 in cotton consumption, while manufacturing margins and employment are far below the 1949-1954 levels.

"We have seen rising imports and falling exports during the year. There has been a sharp increase in imports of cotton textiles from Hong Kong, India, Pakistan and other countries during the year; also, imports of man-made fiber fabrics have risen steadily and dangerously. Government figures show that since 1954 imports of textile manufacturers have exceeded exports. Actually, imports for the first half of 1959 came in at an annual rate of 170 per cent of exports.

"Generally, we face the New Year with hope and with confidence, as we believe that the Tariff Commission has all the facts about imports, the necessary action will be taken to correct the unfair competitive conditions under which we have been trying to exist."

Cotton Farmer Asked To Help

President J. Craig Smith of Avondale Mills, Sylacauga, Ala., recently appealed to Alabama cotton farmers for support of the textile industry's efforts to ease what he termed the "unfair situation" caused by imports from low-wage countries and cheaper cotton prices for foreign textile manufacturers.

"We don't think it is fair and equal treatment to permit our foreign competition to pay as little as 10 cents an hour and undersell us in our own country," Mr. Smith said at a Cotton Improvement Awards Meeting in Tuscaloosa County, Alabama.

He also said, "We don't think it is fair and equal treatment to require us to pay the government support price for our cotton and for our own Government to sell similar cotton to our foreign competitor at a 25 per cent discount, and then permit our foreign competitor to take our home market purely because of his cheap cotton and labor.

"So far as I am concerned, if the Government would levy a tariff on foreign textiles which would have the effect of getting their labor cost up to $1.00 an hour and getting their cotton up to the price we are required by law to pay, I would be willing to take our chances in holding a highly competitive market.

"I don't believe the foreigner can take this market if he has to observe the same legal ground rules that we do."

Cloth Imports At Record Level

Imports of foreign-made cotton cloth reached an all-time high during 1959, according to yearly figures recently released by the U. S. Department of Commerce.

The government figures show that a total of 240,765,000 square yards of cotton cloth was imported from foreign countries in 1959. That total is nearly 100,000,000 square yards more than was shipped into the United States during 1958.

In addition to the cotton cloth, the Department of Commerce said foreign companies sold $150,400,000 worth of other cotton goods in the United States during 1959. That total is more than $38,000,000 over 1958 sales figures.

Total value of all cotton cloth and other cotton goods imported from foreign countries during 1959 was $202,300,000. In 1958, shipments of similar foreign-made items were valued at $150,100,000.

Getting More Help

The textile industry is gradually getting more support in its fight to save the jobs of American textile mill employees from foreign imports.

Just recently, members of the U. S. Commerce Department's Textile Advisory Committee passed a resolution urging quotas on imports of all textile products from overseas. This would mean that no country could flood the United States textile market with goods produced at slave labor wage rates and which would undersell goods produced in our own mills.

More newspaper editors now are supporting our position.

It has been a tough fight and it will continue to be a tough fight, and we need the help of everybody if we are to save our mills and jobs.

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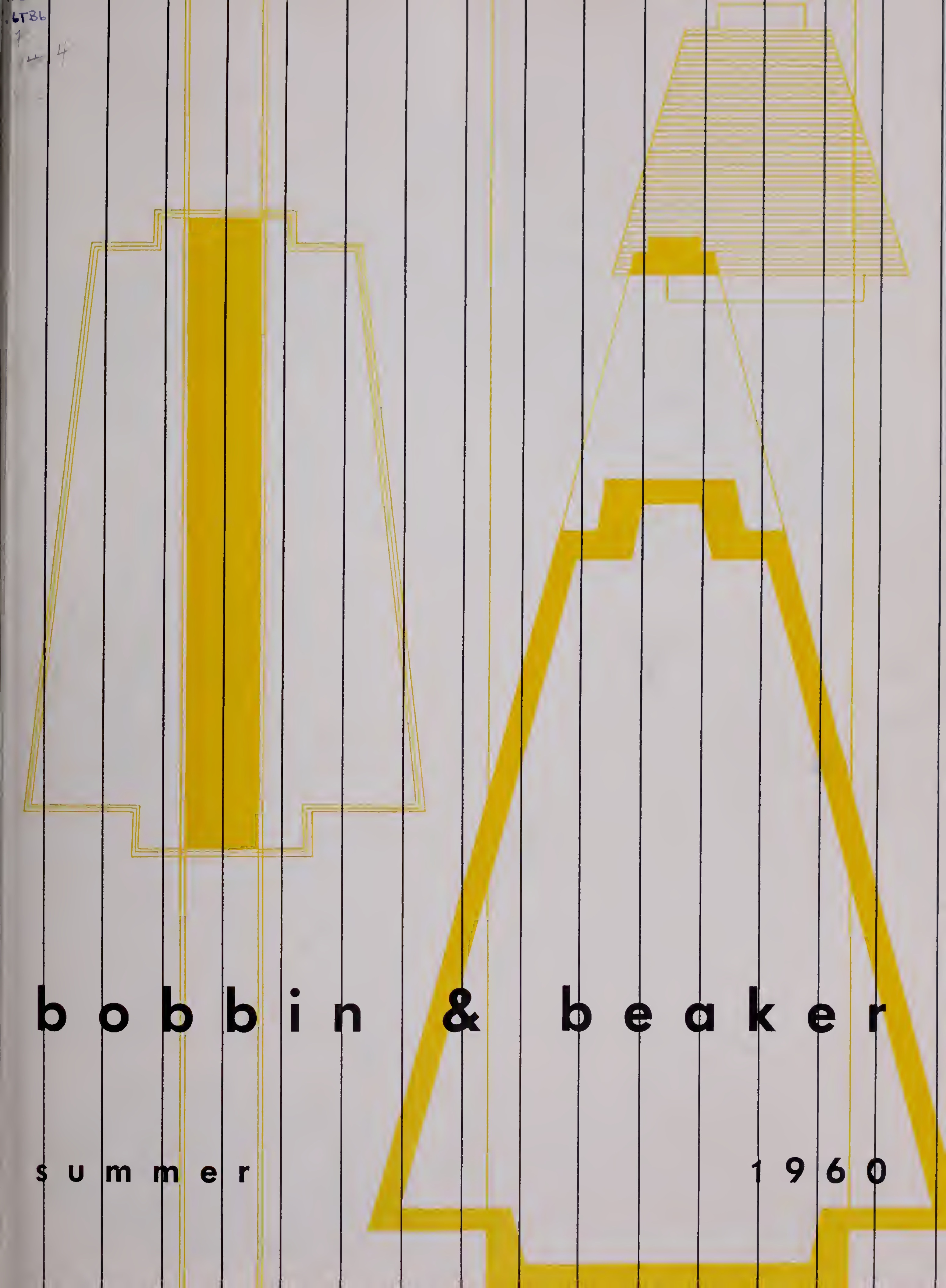

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

from the Editor

In this our first issue and following issues, we the new staff of the BOBBIN & BEAKER will do our best to publish a magazine that will be of interest to all of our readers.

In this issue, the staff has varied the source of articles from men in the Textile Industry to faculty and students in the School of Textiles.

Our one exception is the interesting and informative article on the new drawing frame.

The 1960-61 BOBBIN AND BEAKER staff seated from left to right: Ray Brock, Managing Editor; Tommy Ariail, Editor; Harral Young, Business Manager; Standing, Lewis Kay, Circulation Manager; David Rodgers, Advertising Manager.

Draw Frame With Servo Controlled Draft

SACO-LOWELL/USTER
VERSA-MATIC — ADC

The Versa-Matic*—ADC machine is the first draw frame for cotton spinning with automatic draft control for compensating variation in sliver weight. The ADC servo mechanism comprises a transducer for electronic measuring of the sliver weight per unit length, a transistorized amplifier for the amplification of the measuring signal, as well as a control gear for draft control in a drafting zone, whereby the control of the RPM of the drafting rolls is done in a closed loop circuit.

The system is specially characterized by high accuracy, extremely short response time and utmost simplicity of operation. The short response time permits the control of all variations, even those of very short term nature, at high delivery speeds of the draw frame.

The ADC** servo control has succeeded for the first time, in almost eliminating the weight variations in sliver in cotton spinning. This results in a considerable saving of doublings. Less machines will be required and at the same time improvement in several important yarn characteristics is achieved.

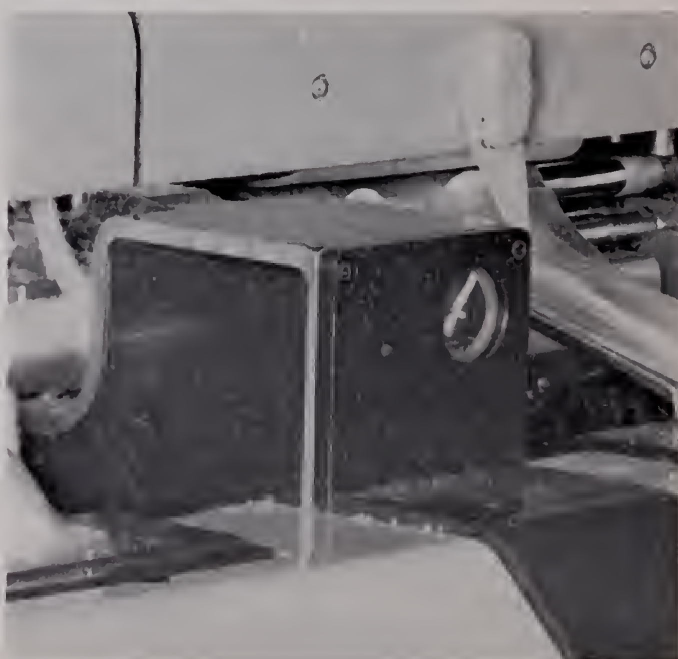
The Development of the ADC System

Ever since spinning machines have been built, it has always been attempted to improve the evenness of the lap, sliver, roving and yarn by automatic control devices. Such a control device has been known for quite some time in cotton spinning, namely the piano evener on pickers for equalizing picker laps.

As far back as 1884, an American, A. T. Atherton, filed the first patent application for such a device for the draw frame. Since then, an enormous number of patents has been registered, according to which an improvement of the evenness of sliver and roving should be possible. However, none of these devices could cope with the practical requirements.

Therefore, in 1953, Saco-Lowell and Zellweger decided to solve this problem together and, since then, they have been working intensively on the design of a new draw frame. In so doing, it was considered an absolute must that the automatic control should in no way limit the speed of the draw frame. Furthermore, a system had to be found which needs only an absolute minimum of supervision, maintenance and service.

The ADC system is based partly on entirely new components, which were specially developed for this purpose. The concept itself is entirely new.



*Versa-Matic VERSAtile, autoMATIC Draw Frame is a registered trade mark of the Saco-Lowell Shops, Boston, Massachusetts, U.S.A.

**ADC AUTOMATIC DRAFT CONTROL is a registered trade mark of Messrs. Zellweger Limited, Uster, Switzerland.

Working Principle of the ADC System

The working principle of the ADC system is described below with reference to Fig. 1. The roll arrangement consists of four pairs of drafting rolls 1-4 and one pair of calendar rolls 5. The main drafting zone lies between the roll pairs 3 and 4, the draft being approximately 3-4. The transducer is located between rolls 2 and 3. Between rolls 2 and 3, there is only a tension draft. The correcting draft zone lies between rolls 1 and 2, the mean draft being 1.27. The full range for this correcting is 1.01 to 1.52, or 20% above and 20% below the mean draft. The speed of calander rolls 5 is also being controlled so that between the front rolls 1 and the calander rolls 5, there is only a tension draft.

The transducer M produces a signal S, proportional to the weight per unit length of sliver. This signal S has to be time delayed in view of the time interval $\triangle t$ required for the material to pass from the measuring point to the drafting point. This is done by a special time delay circuit, whereby the the signal S $(t + \triangle t)$ so produced, represents the nominal value for the RPM control. The draft is thus exactly controlled according to this signal, i. e. according to the sliver variation. The signal S $(t + \triangle t)$ is fed to an error detector which, at the same time, receives a signal T = corresponding exactly to the actual front roll speed.

The error detector compares these two values and figures therefrom, the difference e, which is transformed into a so-called error signal. This is amplified in the amplifier by the multiplier K and fed to the converter C, which converts this new electrical K Xe into a mechanical torque. Due to this closed loop arrangement, the RPM of the front rolls 1 and the calander rolls 5 corresponds exactly to the nominal value: i. e. to the measuring signal S $(t + \triangle t)$. J represents the moment of inertia of all mechanically movable parts, and f represents the friction. The mechanical load is indicated by a circle.

The ADC system is also provided with another closed loop circuit which completely eliminates disturbing influences on the control action. In Figure 1, this circuit is shown as an Integrator followed by a transducer. This device acts at the same time as a fully automatic electric adjustment.

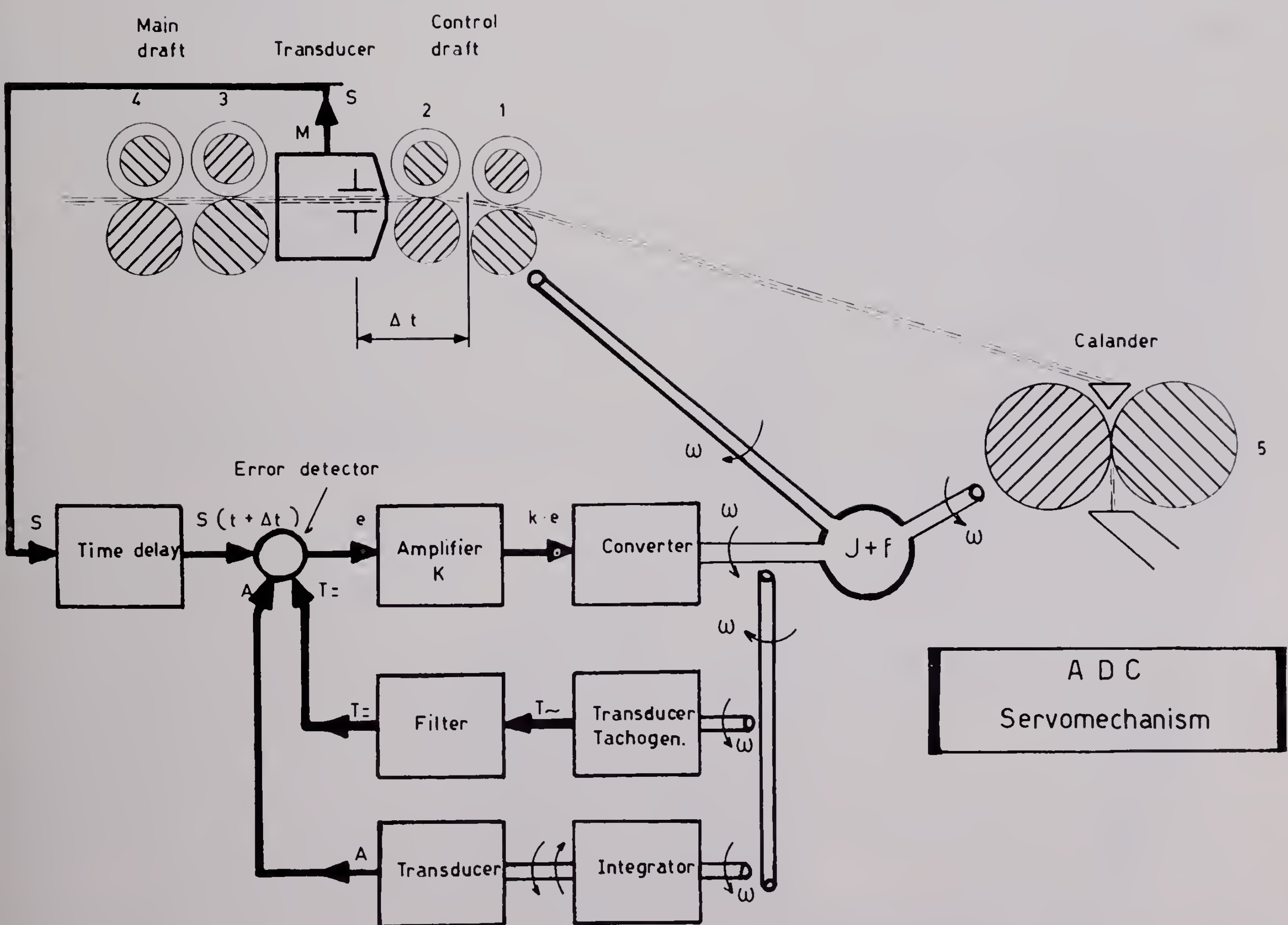


Fig. 1. Skeleton diagram of the servo control. The elements of the ADC-system (measuring, conversion of the measuring values and the control of the RPM) are marked in green.

The Role of the Versa-Matic ADC Drawing Frame in the Mill

The continuous, efficient and rapid action of the ADC equipped Versa-Matic represents in actual mill operation the equivalent of an extremely high number of doublings.

It enables combed yarn mills to reduce their post-combing drawing processes to one only, this remaining process being of course an ADC drawing. Whether and to what extent, substantial savings will also result in carded cotton mills, has still to be confirmed. Not all results are final as yet.

In any case, the present Versa-Matic ADC, with its 4 ends up, will allow an interesting saving in floor space compared to any conventional Drawing Frame requiring 6 or better 8 ends up.

The unusually high uniformity of the drawing sliver remains the most important, immediate characteristic of the New Versa-Matic ADC.

Corrections of the irregularity, such as those obtained with the ADC draft control, will never be achieved on conventional drafting zones owing to the fact that the latter cannot take any correcting action based on a measurement.

Technical Data for Versa-Matic ADC

1. **Production Speed**
   Normal operating speed: 400 ft./min.
   Both the machine and the ADC device will, however, operate satisfactorily at lower speeds of approximately 300 and 350 ft./min.
2. **Range of total draft:** 3 to approximately 5
3. **Number of doublings:** 4
4. **Range of sliver count**

English:	from	0.24	to	0.12
Grains/yd.:	from	35	to	70
Metric:	from	0.40	to	0.20
Tex:	from	2500	to	5000

5. **Roll clearers:** Mechanical or pneumatic, optional
6. **Diameter of the drafting rolls** (see Figure 1)

1st	1 1/8"	1 1/8"
2nd	1"	1 1/8"
3rd	1 1/4"	1 5/16"
4th	1 1/4"	1 5/16"

7. **ADC Device**
   —Amplifiers and supervision units are fully transistorized, the life of transistors being considered unlimited.
   —Power as supplied by the mill main line and any voltage between 200 and 600 V are satisfactory. No further provisions for transformers. The total power consumption of the ADC device is about 100 watts.
   —All electronic components are designed as plug-in units and can easily be replaced.
   —The entire equipment is self-supervising. As soon as a disturbance occurs, an alarm is engaged, the machine stops and a special control lamp lights up.
8. **Maintenance and Operation**
   Operating a Versa-Matic ADC frame is the same as a normal frame. The personnel has nothing new to learn and the ADC system does not limit the production or the efficiency of the frame.
   Maintenance is no problem. The control gearing runs in an oil bath and the ADC system does not incur additional lubrication.

Comments on Chart

The improvements which have been made on a combed yarn, on a carded yarn are shown in the chart. In each case, the breaking length has increased considerably and at the same time, the coefficient of variation of the breaking strength has dropped. The elongation is also significantly higher. Of particular note, is the fact that the variation of the yarn count has decreased considerably.

Typical Improvements Which Will Be Obtained With the Versa-Matic ADC Draw Frame in the Yarn

Material and Yarn Count	Process	Breaking Length (km)	CV Breaking Strength (%)	Elongation (%)	Count Variations CV %*
Sudan 1 1/16" combed	Conventional	15.9	11.9	7.1	4.8
English count 30, Metric count 50	Versa-Matic ADC as Single Draw Frame	17.3	8.0	7.5	1.0
Waste Cotton 1" carded	Conventional	12.8	12.4	8.2	3.1
English count 20, Metric count 34	Versa-Matic ADC as Single Draw Frame	13.6	10.1	9.8	1.4
Cotton Blend 1—1 1/32" carded	Conventional	13.7.	13.5	8.1	2.9
English count 24, Metric count 40	Versa-Matic ADC as 2nd proces	14.1	11.3	8.4	1.5

* Coefficient of variation CV % of the count variations determined between several bobbins over a length of 120 yds.

Advantages of the Versa-Matic ADC Frame and the Improvements in the Yarn

—In the case of combed stock, only one drawing process is required instead of two. Therefore, the space requirements are less and there are savings in operation and maintenance. At the same time, there is considerable increase in the quality of the yarn.

—In the case of carded stock, a considerable increase in the quality is obtained without additional processes.

Influence on the Yarn

The ADC yarn, when compared with conventional yarn, shows the following improvements of the quality characteristics:

—higher breaking strength,
—smaller coefficient of variation of the breaking strength,
—less thin spots,
—higher elongation,
—fewer ends-down on the roving frame and on the ring frame,
—fewer stoppages on the winding machine,
—fewer loom stops in weaving and less stoppages in knitting,
—produces a better woven and knitted fabric.

A.A.T.C.C. News

by

Ray Brock '62

The Clemson Student Chapter of the American Association of Textile Chemists and Colorists enjoyed a most successful year during the 1959-'60 term, with membership greatly exceeding that of the previous year.

Club members were given the opportunity to hear speakers with topics of wide interest in Textile finishing. A field trip to the Rock Hill Printing & Finishing Co., and Celanese Corporation plants was also very enjoyable. These activities gave first-hand information concerning the diversified operations of the ever-progressing Textile Industry.

Officers for the 1959-'60 term include: Ralph Sims, President; Roger Hinson, Secretary; and Nolan Etters, Treasurer. Mr. Joseph Lindsay, Jr., is Club Advisor.

THE STANDARDS DEPARTMENT -- A GOOD PLACE TO START

By
J. L. Richardson
Assistant Professor of Textiles, Clemson College

It has often occurred to me that the standards department is a good place for textile graduates to gain leadership and management experience. I know of no other department where so much information can be obtained regarding the overall operation of the plant. One has the opportunity to observe management functioning from the executive level down to second hand level. This experience is valuable to one who will later serve as a department supervisor or in some executive capacity.

We need only examine some of the duties and responsibilities of this department to appreciate its potential training facilities. While the required functions of the standards department do vary from one organization to another, some of the more frequent occurring duties are as follows:

1. Make time studies
2. Improve methods through motion study
3. Determine anticipated production per machine and per operator
4. Establish piece rates
5. Determine job assignments
6. "Trouble Shooting" (isolating causes of low efficiencies and recommending corrective measures)
7. Determine correct machine speeds
8. Make machine speed checks at periodic intervals
9. Job evaluation
10. Make machinery layouts
11. Represent the company in bargaining with labor union
12. Study prospective new machinery
13. Develop periodic labor control budgets
14. Direct and evaluate physical inventories
15. Make material handling studies
16. Develop supervisory bonus plans
17. "Off job" employee training

The standards department is basically a staff department and as such must depend to a large extent on its leadership ability to work with people to get the job done. Therefore, in this department, the trainee sees the importance of such matters before being placed directly in charge of employees. It has often been said that the ability to work with people, to create cooperative attitudes and job enthusiasm among employees—all are important requisites for a good supervisor.

When making time studies the trainee works with supervisors and employees in all departments. This acquaints the trainee with both time study and the day to day problems of supervisors and operators. He is able to observe the techniques used by experienced foremen in supervising work. In the future when the trainee serves as a department head, he is able to appreciate the problems of fellow supervisors and as a result is more tolerant of their problems.

Methods analysis and motion studies made by the standards department provide the trainee with an appreciation of how to lay out jobs in the most efficient manner. This training also enables the potential supervisor to more intelligently answer questions put to him by employees concerning work of the standards department.

Experience in the standards department also brings about a more cooperative attitude towards this department since the potential supervisor understands why the standards department must have certain information or do things a certain way. This cooperative attitude is necessary if the standards deparment is to do an effective job. If a supervisor has the proper attitude towards motion and time study work, his employees will soon have the same attitude. All too frequently if the boss is opposed to something his employees are also opposed.

Experience in establishing the standard, determining job assignments and piece rates later gives the potential supervisor confidence in rates and job assignments in his department. Some supervisors do not understand how these things are determined and therefore are sometimes skeptical of the results. It is human nature to be somewhat skeptical of things we don't understand.

"Trouble shooting", that is analyzing low efficiency jobs, gives the trainee experience in how to systematically isolate the principal causes of low efficiency and to take the proper corrective measures.

Preparation of a weekly labor control budget causes one to appreciate the value of labor controls. Analysis of this budget shows why a particular department "went in the red" for the week. This type budget compares standard costs with actual costs.

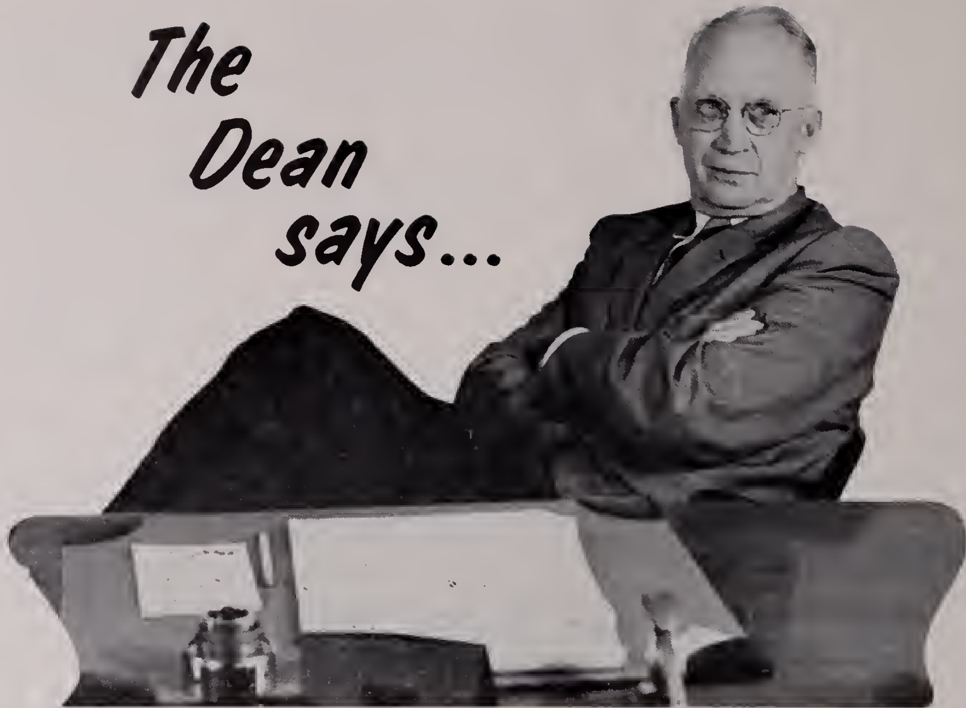
When employee training and indoctrination is a function of the standards department the trainee realizes the importance of getting the new employee oriented on his job. An employee properly introduced to his job frequently is a happier and more satisfied worker. Actually, supervisors often do not instruct the new worker on such matters as safety precautions and plant policies with regard to absenteeism, rest periods and smoking.

Since the standards are used by the cost department to establish cost estimates, there usually exists a rather close relationship between the standards department and this department. In some small plants, the cost and standards work both are prepared by the same department. Therefore, the trainee gets experience in cost estimation and soon realizes that the net profit per yard is usually small in the textile industry. This emphasizes the importance of operating efficiently and indicates that large volume production is necessary for reasonable profits.

Controlling labor cost is an important element of supervision. Often the labor cost is the largest single element of the supervisors controllable costs. Thus the supervisor is directly concerned with the time standards, work methods and working conditions which determine his labor costs. He must constantly be looking for ways to reduce labor costs and increase production. This, after all, does not vary much from the very basic reason for the standards departments existence.

The standards department—a good place to start.

The Dean says...



Preliminary Study of Former Clemson Textile Students Made

1272 REPLIES FROM 2100 CARDS RETURNED BY MARCH 22, 1960

A statement that is constantly encountered is to the effect that the textile industry is a hazardous industry. The common saying is that it is so rough that you can't live with it. The primary purpose of the survey was to find whether there was any foundation for this talk.

I mailed out a post card questionnaire to all former students of the School of Textiles whose names and addresses were on file in the alumni office. The number was about 2100. Answers to these cards are still coming in but the results shown here are from the first 1272 answers.

The return card asked that the following information be filled in:

Name ______________________________

Home address ______________________________

Employer ______________________________

Plant ______________________________

Address ______________________________

Present title ______________________________

Never worked in the Textile Industry ☐

Left the Textile Industry entirely ☐ after ________ years.

Now in a related industry ☐

Everyone says that the fact that we have received over 1300 answers from 2100 cards is remarkable. This is 62% return when 25% return is called good.

The results of this survey are produced below.

Employment History — 1272 Individuals

	No.	Per Cent
1. Never in Textile Industry	119	9.35
2. Left Industry	205	16.12
3. Closely Related Industry	150	11.79
4. Directly in Textiles	798	62.74
5. 3 & 4 above together	948	74.53
Total	1272	

Those Who Never Entered Textiles
Present Occupation — 119 Individuals

*Government employ (Incl. State and Local)	58	48.74
Other Industries	26	21.85
Self Employed	19	15.97
Others	16	13.44
Total	119	

Those Who Left The Textile Industry
Present Occupation — 205 Individuals

Government (Incl. State and Local	64	31.22
Other Industries	60	29.27
Self Employed	40	19.51
Others	41	20.00
	205	

*Includes members of recent classes serving their time in the Armed Services.
Many will enter the industry upon completing this service.

Number Of Years In Textile Industry Before Leaving
205 Individuals

One year or less	53	25.85
One to 5 years	83	40.49
After 5 years	69	33.64

Present Positions
798 Individuals Directly in Textile Industry

President, V. Pres., Gen. Mgr.	63	7.89
Plant Mgrs. & Gen. Supts.	66	8.27
Superintendents	75	9.40
Tech. Supt. & Ass't. Supt.	116	14.54
Overseers	125	15.66
Ass't. Overseers	60	7.52
Trainees	82	10.28
*Staff	134	16.79
Research	18	2.26
**Sales and Service	52	6.52
Office Managers	8	1.00
Misc.	53	6.64
Total	798	

This shows that: (1) seventy-five percent of those heard from are still in some phase of the textile industry; (2) of those who never entered the textile industry, many are serving their time in the armed services and will enter the industry when this service is completed; (3) many have chosen the military as a result of World War II service; (4) of those who entered the textile industry and then left it, one-fourth left within a year and two-thirds left within five years.

These figures are the results of 1272 answers from 2100 cards. For this reason totals are incorrect but the percentages should be dependable.

Taken as a whole, this survey shows that the textile industry offers wonderful opportunities for permanent and satisfactory employment. The School of Textiles is proud of the success of its former students.

*Quality Control, Costing, Designing and Methods and Standards, etc.
**Largely with man made fiber manufacturers.

Outstanding Seniors . . .

James Alan Bell, from Gatlinburg, Tennessee, is a Textile Engineering Senior. He is a very capable and dependable student who combines his studies with many varied extracurricular activities.

Alan has become familiar to our readers by his excellent work on the BOBBIN & BEAKER staff, of which he has been a member for the past three years. In his junior year he was Managing Editor and is now the Editor. Besides this office, Alan was the secretary of NTMS in his junior year and now leading the club as president. Alan has also been a member of Student Assembly, Council of Club Presidents, Wesley Foundation for two years, NTMS for three years, and a member of the Freshman Swimming Team. Alan is finishing his two years of Advanced Army ROTC and will be commissioned in the Quarter Master Corps. Alan has been helped with his financial expenses by the Ada Hearne Foundation Scholarship for four years. From his four summers' experience at Cherokee Textile Mills, Alan has gained valuable experience in the textile field.

Wilfred L. Robertshaw, a Textile Manufacturing major, is from Greeville, South Carolina. Before coming to Clemson, Wilfred was in the U. S. Army for two years. During his stay at Clemson, he proved himself an industrious student by maintaining good grades all the time and receiving honors in his second semester 1958-59, and first semester 1959-60. From his 2½ years at Southern Worsted Mill, Wilfred has already much valuable textile experience. Wilfred has helped defray his expenses while at school from the money he saved while in the army and from his mill work.

James C. Knox is a Textile Manufacturing major from Richburg, South Carolina. He is a capable and well-liked student who participates in several extracurricular activities. In his freshman year, James used his vocal talent in the Clemson Glee Club. Now, he is an active member of the Clemson chapter of Phi Psi, national honorary fraternity, and the NTMS. James has gained valuable experience from his two summers work at Grace Plant in Lancaster, South Carolina. He has been helped through school by a loan scholarship from Springs Cotton Mills.

Quality Control

By
Evans A. LaRoche
Associate Professor of Textiles
Clemson College

Recent years have seen a new term come into general usage, the term "Quality Control". We read or hear it in newspaper and television advertising, we see it on the label of products, and we even find want ads for Quality Control Engineers. Associations have been formed for the purpose of promoting Quality Control, such as the American Society for Quality Control (with its six divisions, including a Textile Division) and the Textile Quality Control Association. For those who are not familiar with the term, this article will serve as an introduction to Quality Control.

First, let us remember that manufacturers, dealers, and the consuming public have always been interested in quality, although not always agreeing on the meaning of quality, or on the quality which should be provided for a given price. Manufacturers have for many years inspected their incoming raw materials to see that they were satisfactory, their intermediate products to see that standards were being met at each stage of production, and their finished product to determine acceptability. Dealers have done routine testing, or relied on the certified tests of others, to determine whether specifications were being met. Customers have always exerted a great influence on quality by their refusal to buy, or by shopping elsewhere for a better bargain. Thus, we can see that the interest in quality, and the efforts to control quality are not new.

The increase of interest in Quality Control has been brought about largely by the addition of statistical procedures, or "Statistical Quality Control", to the methods already in use. By statistical, we mean that numbers calculated from samples are involved. The mean of a sample, commonly called the average, is a statistic obtained by adding all measurements of the sample together and dividing by the number of items in the sample. This is the statistic most commonly used for showing the center of a sample. The statistic used to express the spread or dispersion of a sample is often the standard deviation, which has a formula (given in standard works on Statistics or Quality Control) involving the use of squares and square roots. An alternate measure of dispersion is the range, found by subtracting the smallest measurement in a sample from the largest. While the range is not as useful a statistic in someways as the standard deviation, its ease of calculation makes it desirable, and it can be used for a very good estimate of standard deviation. Other statistics may be the proportion (or fraction) of material classed as defective, or the actual count of defects of a certain type. These numbers, or statistics, are the basis of our efforts to guide or control the quality characteristic to the desired level. This quality characteristic may be weight, length, resistance to abrasion, hardness or any other property.

Behind the use of Statistical Quality Control is the idea that every type of product varies, whether the product be automobiles, nails, electric light bulbs, yarn, or animals. The product turned out by one machine will vary, just as the pigs in one litter, or the leaves on one tree, will vary. Yarn from the same bobbin will vary in size and in tensile strength; sliver from the same card will vary in weight; and cloth from the same loom will vary in several respects, such as weight and the number of imperfections. The problem, therefore, becomes one of determining how much variation is expected, or reasonable, and what amount of variation should cause us concern.

In determining a quality characteristic, we may record actual measurements, such as grains per denier for breaking strength, or weight per yard for sliver.

Or we may simply decide that an item is acceptable or not, on the basis of meeting or failing to meet specification. For example, cloth may be the proper shade after dyeing, or it may be an unacceptable shade, while filling quills may either fit or not fit into your shuttles. No measurement is necessary, but only a decision to accept or reject, to classify as first class or some other than first class. Another method of determining quality is a count of individual defects, such as fabric imperfections, where a certain number of defects are permissible and expected. The "Statistics" derived from these measurements, decisions, or counts must be handled so as to get the most benefit from them.

All of us are frequently called upon to make decisions on whether to accept a statement as being true, or to reject it as being unlikely, or false. We rely on past experience and the credibility of the source of the statement. As an everyday example, someone's claim to have seen a cow while on his way to work would be accepted or ignored, but seldom questioned. An additional claim that the cow was purple, however, would raise serious doubts concerning the vision, sobriety, sanity, or truthfulness of the speaker. There may be purple cows, but who has seen them? Likewise, statisticians have tests to accept or reject statements in the light of the statistics obtained from samples. A question might be phrased in this fashion: "Is the statement that all card sliver in Mill A has a mean of 50 grains per yard a reasonable and acceptable statement, when a sample of 5 yards gives an average weight of 49 grains per yard?" Statistical tests would give us a basis for deciding whether this is reasonable, or unlikely.

Because most statistical tests and terms give the appearance of being "difficult" to many people, statistical procedures were not widely used by certain industries until some simplifications were made. The most important changes or additions were the substitution of control charts for more complicated statistical tests, and the use of sample ranges, rather than standard deviation, to measure dispersion (or scattering) of the measurements in a sample. The control chart technique is now in widespread use in all types of industry, and is the basis of most "Statistical Quality Control".

Control charts may be divided into 3 types: charts for means (averages) and ranges, charts for fraction defective, and charts for defects per unit. Detailed instructions and examples of control charts of all types are to be found in the literature, and the bibliography at the end of the article includes some excellent books on the subject. For this reason, a description of the control chart for means and ranges, only, will be given here.

Control charts for means (known as X-bars) are prepared by plotting the mean of a sample, usually 4 or 5 measurements, on a graph drawn to an appropriate scale. As each succeeding group of measurements is taken the sample mean is plotted, in the order in which samples were taken. Thus, the horizontal scale shows the samples, by number, or my some element of time, in the order taken. The vertical scale shows the units (pounds, grams, inches, etc.) in which the measurements were made. Using the same sample numbers or time elements but another scale, the ranges of each sample are plotted below the corresponding mean. The two charts go together and supplement each other, and neither is complete by itself. The plotted points will vary considerably, but the majority of points on each chart should be concentrated in a narrow band, with only a few points in extremely high or low positions on each chart. No control chart, however, is complete without a center line to indicate average values, and limits to help in deciding whether variation is reasonable or unreasonable.

Basically, the control chart for means works because sample means tend to approach a normal distribution, if the sample size is large enough, regardless of the shape of the population or universe from which the samples were drawn. Samples of 4 or 5 measurements will usually be large enough to give an approximately normal distribution of sample means. Since in a normally distributed universe, practically all individuals will be found within three standard deviations on either side of the mean, we can apply three-standard-deviation limits to the control chart. A point falling beyond these limits indicates variation in excess of that normally expected. Stated another way, it is highly unlikely that a universe with a mean at the level shown by the center line would yield a sample whose mean was so far distant from the center line. Therefore, the process is said to be "out of control", meaning that there is an unreasonable amount of variation, the cause of which should be found and eliminated. Although the range does not follow a normal distribution, control limits are likewise set on this chart to judge whether individual ranges are reasonable or excessive.

Center lines for the control charts for means and ranges are determined by averaging the sample means and sample ranges, respectively. Twenty-five samples are usually considered sufficient as a basis for this calculation. Standard textbooks on statistics or on Quality Control give factors for setting control limits on both mean and range (or X-bar and R) charts, and no tables of factors will be given here, but an example will suffice to show this calculation.

Suppose that 5 bobbins of yarn are taken from

each doff of a spinning frame and a 120-yard skein from each bobbin is weighed and recorded. Then the mean and range of each sample of 5 is computed, recorded, and plotted on a chart. After 25 doffs have been sampled, computed, and plotted the sample means are averaged giving a value of 55 grains. This is the best estimate, at this time, of the mean of all yarn from this frame, and becomes the center line of the X-bar chart. The sample ranges are averaged in the same fashion, giving an average range (R-bar) of 1.5 grains, which is plotted as the center line of the R chart. For samples of 5, the factor for X-bar chart control limits is .58, and the factors for R chart control limits are 0 and 2.11. Thus we have the following calculations and control chart:

Upper Control Limit for X-bar = $55.0 + (1.5 \times .58) = 55.87$

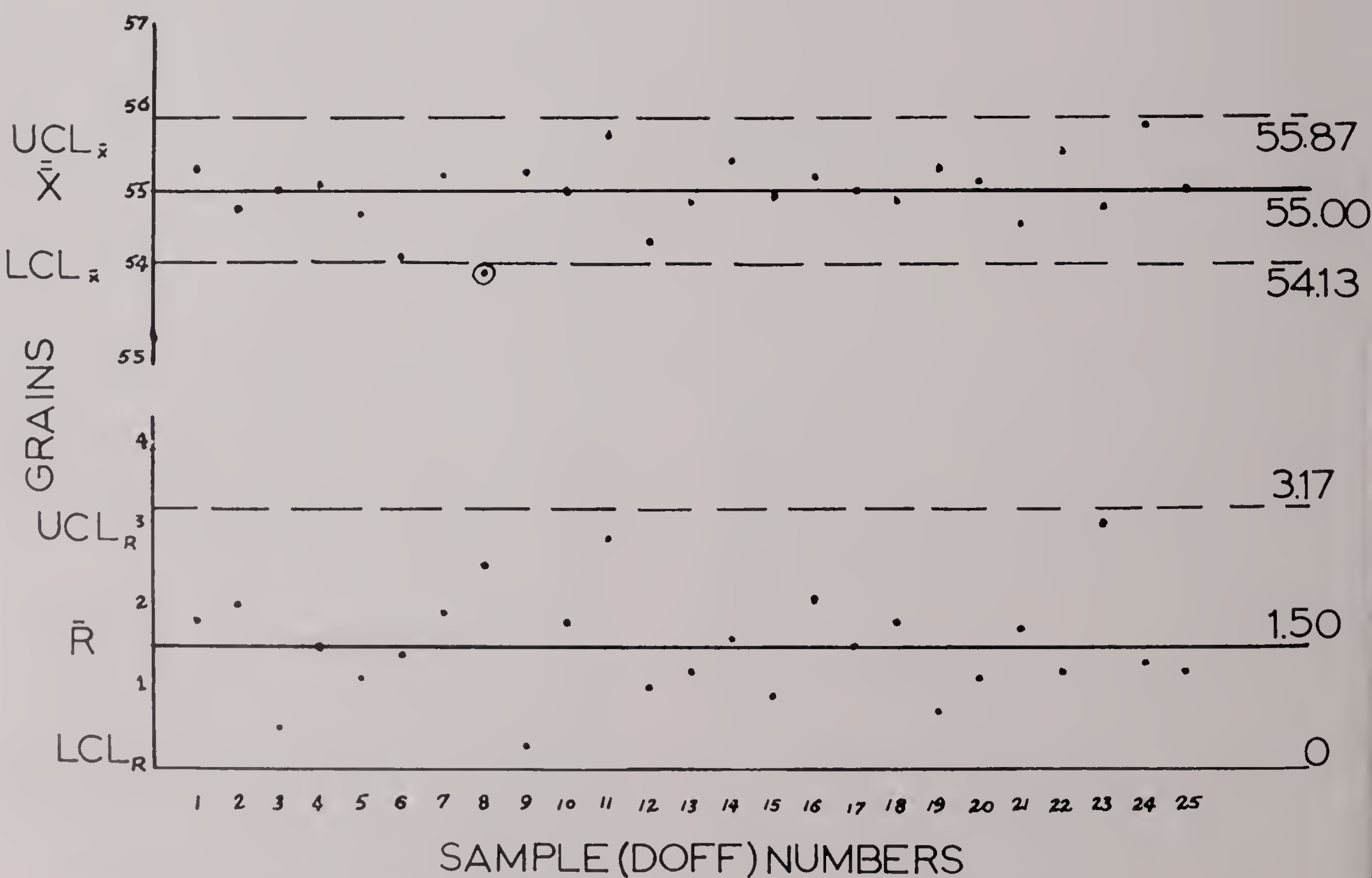
Lower Control Limit for X-bar = $55.0 - (1.5 \times .58) = 54.13$

Upper Control Limit for R = $2.11 \times 1.5 = 3.17$

Lower Control Limit for R = $0 \times 1.5 = 0$

From the above calculations, we would expect the means calculated from 5 bobbins each to vary between 54.13 grains and 55.87 grains. (Individual measurements will go beyond these limits much of the time; these limits apply only to means.) Ranges from samples of 5 bobbins each should vary between 0 and 3.17 grains. Any means or ranges beyond these limits indicate either that something is causing excessive variation, or that a very unlikely sample has been found, the equivalent of the purple cow in the previous example. We will seldom be wrong in assuming that the point out of control is due to excessive variation from some cause which we must now find and eliminate. Remember that these limits apply only to statistics from samples of 5, to this spinning frame only, and only as long as no change in the process is made. The control chart is a picture of the process as it exists, not perhaps as you would like it, but as it is at present.

Since it seldom does much good to determine that a process was out of control 10 days ago, the greatest value of the control chart lies in projecting the center line and control limits into the future, and comparing each statistic with the limits, as soon as it is plotted. A decision can be made with the plotting of



Control Chart for Means (X) and Ranges (R)

each sample, either to look for the cause of the variation (if the point lies beyond control limits), or to leave the process alone since the variation is reasonable. Adjustments in the center line and control limits may be made when changes are made in the process, when causes of excessive variation are eliminated, or after certain periods of time when additional samples give a better estimate of the mean value of all yarn produced by this spinning frame. Prompt attention to indications of lack of control, such as points beyond the control limits, or 7 consecutive points on the same side of the center line (like 7 consecutive "heads" in tossing coins) will enable the foremen to quickly find the cause of trouble and keep variation to a minimum.

The control chart for fraction defective ("P" chart) and the control chart for defects ("C" chart) are similar in usage to the control chart for means and ranges, although based on different statistical principles. Again, limits are plotted on the chart for fraction (or percent) defective to determine whether the day-to-day variations is excessive or within reason, and a decision is made to search for the cause, or to leave the process alone. Control limits on the control chart for defects tell us, "This number of defects is excessive, and we must find the cause", or "This is a reasonable number of defects, and we should leave the process alone."

These are the techniques of "Statistical Quality Control". They may be supplemented by good sampling plans based on the theory of Probability, by refinements and adaptations of the basic charts, or by the use of more highly developed statistical procedures. Countless organizations in almost every industry have used these techniques, not as an answer to every problem, but as an aid in solving the problems by sound management and engineering decisions. The current trade journals for many branches of industry carry articles about the successful applications of Statistical Quality Control, and the well-attended meetings of organizations devoted to Quality Control attest to the interest in this subject.

With the recent changes in curricula of the Textile School at Clemson College, two semesters of Quality Control were added to all three curricula, Textile Chemistry, Textile Management and Textile Science. The first semester is concerned largely with the introduction to statistical principles and procedures, while the second semester deals primarily with the practical application of control charts and other techniques to the textile industry. A three week, no-credit, course in Quality Control was offered during the Summer of 1959, and will be offered in the summer of 1960, for mill personnel interested in this rapidly developing field.

This, then, is a very brief description of Quality Control. There is a definite place for it in any organization, as one of the tools of Scientific Management.

SUGGESTED READING

1. "Statistical Quality Control" by E. L. Grant, McGraw-Hill Book Company.
2. "ASTM Manual on Quality Control of Materials", ASTM, Philadelphia, Pa.
3. "Quality Control Handbook", J. M. Juran, McGraw-Hill Book Company.
4. "Quality Control and Industrial Statistics", A. J. Duncan, R. D. Irwin and Company.
5. "Quality Control through Statistical Methods", N. L. Enrick, Modern Textiles Magazine Handbook.

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The Problem of Tint Fugitivity

by
Ray Brock '62

The problem of tint fugitivity is becoming more apparent with the production of the new synthetic fibers which have been introduced in the textile world in the past few years. It is necessary that these new fibers have some means of identification while being processed, and the best means of doing this is to put some sort of tint on the stock in order that each different type of fiber may be recognized.

There are a number of dye companies which have done everything in their power to make tints which will shade the stock enough that it may be differentiated from cotton, and other types of fibers. Although these companies have produced a great number of tints which are satisfactory, there is still an ever increasing demand for new tints which will prove to be fugitive.

Before a textile organization can tint a certain stock they must run tests on each color of tint and type of fiber before they put that particular tint into production. There are literally hundreds of questions to be answered in a test of this type. Such questions as:

(a) Will the tint harm the fiber in any way?
(b) Will the tint come completely out, or will it leave a dull overcast on the stock?
(c) Will this tint cause unpleasant working conditions because of foul odors, etc.?
(d) Will the tint be able to be purchased easily and in sufficient quantity if it proves to be satisfactory?
(e) Is this tint the most economical one to be used?

These are only a few of the questions which the textile plants must ask before the tint is given the okay for production.

In the actual testing of a fiber in the laboratory the first problem that occurs is establishing a suitable method for applying the stock. After trying a number of different methods it was decided that the best method of application was to spray a desired solution on the stock and carding it with hand cards to make sure that the tint is sufficiently spread throughout the stock. The tint solution in the laboratory is usually mixed so as to make the solution a little more saturated than it will be when actually put on the stock. This is only the method for a cold water application. Another method is used to simulate the conditions which are present while the stock is being processed in the slasher room. This is known as the hot water application. It is believed that this method will tend to saturate the stock with as much tint as it will have in it during any process. In this method the stock is dipped in boiling water for a short period of time and then the tint is applied as it was in the cold water application. Both the cold water application and the hot water application are necessary in order that the laboratory may be completely sure that the stocks have had sufficient tint applied, and they have had just a little more than they would in the actual processing.

After the application of tint, the different samples are allowed to dry, either air dried or oven dried. It is probably best to air dry the stock, because if the stock is allowed to remain in the oven too long, it is possible to scorch it making the fiber lose its original color.

The stock, completely dried, is now ready for removing the tint. The tint is first tried to be removed by cold water. If cold water does not remove the tint, it is then tried to be removed by hot water. If hot water does not prove to be sufficient, the stock is boiled in soap and water. As a last resort, the stock is boiled in Tetra Sodium Pylophosphate, soap, and water.

After running a number of different colors and makes of tint on a certain stock, it is then classified as to which of the above methods remove the tint from the stock. If none of these methods removed a sufficient amount of the tint, it is then classified as non-fugitive.

Most of the problems in removing tint are not concerned with the removing of the tint from one particular type of sort. Many of the "headaches" of tinting come in removing the tint from blends. Many times it is possible to remove the tint from one of the types of stock used in the blend, but the other type of stock is completely non-fugitive in that certain tint. In this case it is necessary to run the complete test on the same two types of stock over again.

As a positive check, the stock is then tested again after it has been completely processed. If the tint proves to be fugitive when the stock is in woven form, it is given the final okay, and the tint is considered to be standard for that particular blend.

Through the wide use of synthetic fibers these methods are being improved and as have most of the problems which cause the most trouble, these will soon be conquered by increased research.

Psychological Effects Of Industrial Color

By
Harral Young, TM '61

To fully understand the value of proper color usage, we must first understand what color is, and how we see it. "Color", it is said, "is largely a physical manifestitation and the psychological response of humans to such radiation." [1]

When we use the word "color", we do not refer to size, shape, texture, gloss, flicker, or transparency, although each of these definitely affects it. The way that we see these is called color perception.

It is common practice to speak of an article as containing color, but, in a sense, this is incorrect. The article may contain some coloring agent, but color itself does not exist in the object, rather in the brain of the observer as a psychological experience. "Color, like beauty, lies in the eye of the beholder."[2]

Without light, there is no color. To make a pure white light, there are seven components of different color. The components are individually colored light rays of varying wave length. They range from the invisible infrareds on one side, to the ultraviolets on the other. Between these two extremes we find the colors represented by the term "VIBGYOR". These letters represent the colors Violet, Indigo, Blue, Green, Yellow, Orange, and Red. These are the basic colors of light, although it is estimated that the human eye can distinguish some 100,000 shades of these basics.

When William Shakespeare stated that the whole world was a stage, he probably did not realize how true his statement was. As any modern movie-goer knows, the scenery and stage sets create the atmosphere and mood for the movie. Elia Kazan movies, where there is usually a depressing situation, would not be nearly so effective to the audience if it were filmed in color as it is filmed in the drab grays and blacks. This is taking advantage of the psychological effect of color. So, too, must industry use this phenomenon.

Color affects the mood and positive responses throughout the entire human organism. Two of America's most highly recognized athletic coaches took advantage of this fact. Amos Alonzo Stagg had the dressing room of his football team painted a pale, restful blue to help combat the "pre-game butterflies". Immediately before leaving the dressing rooms to go on the field, the players were given last minute instructions in a brilliant red anteroom. The color involved here, created exactly the opposite effect of what had been achieved in the blue dressing room. The players became tense, excited, and "fired up" for the game. Knute Rockne employed the same system except that he made certain that the opposing team's room was a dull, depressing color.

The primary reason for industry's sudden interest in color schemes came about with the realization that factories were not only built to house machines, but also to serve as a habitation for the workers who run the machines.

When it was found that changes in color could actually cause a rise or fall in a persons blood pressure, speed up or slow down his heart beat, and change his entire personality under given situations, importance began to be linked with color conditions.

Consciously or unconsciously, color is a constant influence on an individual, assuming, of course, that he is not completely color blind. It is estimated that less than four per cent of the males suffer from this ailment, while less than two percent of the females have the same trouble distinguishing color. This definitely shows that males have more tendency toward color blindness than do females.

To illustrate the psychological effect that color has on an individual, a very simple experiment was con-

[1]W. H. Peacock, **The Practical Art of Color Matching.** (American Cyanamid Company, 1953), p. 9.

[2]**Ibid.**, p. 9.

ducted. Two boxes of equal size and weight were placed an equal distance from the subject. The only actual difference in the two was that one was dark brown, while the other was pale blue. When asked to move one of the boxes, the subject invariably chose to move the blue one because it gave the illusion of lightness. He was then asked to put his box on one of two tables. Here again, the tables were the same except for color. One was blue and one was red. This time he chose the red because,although they were the same distance from him, the red one appeared to be closer. The blue one gave the illusion of depth or distance. At one time during World War II, the Army warned its truck drivers to be especially careful when parking vehicles between two blue objects because the space looked larger than it actually was.

There is a proven reason for these illusions. The lens of the eye works like the lens of a camera; therefore, there is a marked degree of chromatic aberration—different wave lengths of light focusing different distances behind the lens.

Another incident which shows how this fact works in every day life was explained by an English professor. He, after being beaten several times by an opponent in a tennis match, introduced a red ball. His opponent, not accustomed to the red ball, would consistently swing early because he misjudged the distance. Consequently, the professor won the game.

The biggest step in the crusade for color in industry resulted from a study of illumination. Illumination and fatigue are directly related. Fatigue is both physical and mental, and must be approached from both angles.

Four good, simple rules to remember when planning a lighting system are: avoid gloom, avoid glare, avoid dark shadows, avoid excessive contrast.

When deciding on lighting and color in conjunction, management must realize that, although visibility is better under bright light conditions, this is an open invitation to fatigue. An Olympic Weight Lifting Team served as the "guinea pigs" to prove this. The training room was highly illuminated for a short training period. When the lifters started their work out, it soon became evident that they were not showing top form. The members quickly became dissatisfied and tired, and started quarreling among themselves. Under these bright conditions, the psychotic make-up of humans may cause them to unconsciously rebel from their tasks.

From the physical viwepoint, the contrast caused by excessive illumination causes the pupil of the eye to dilate, and then return to normal, frequently. As insignificant as this slight muscular movement seems, it will cause fatigue to set in rapidly.

Fatigue, regardless of how it is caused, causes workers to become nervous, careless, and indifferent. Here, we can readily understand how illumination and safety are connected.

A modern research firm carried on a survey in 350 companies. The companies all followed a carefully arranged color scheme. The figures, which are an average for all the participating companies, showed that there was a 67.4% improvement in lighting conditions, 27.9% increase in production, 30.9% improvement in quality, 19.7% less eye strain and fatigue, and 14.7% less absenteeism.[3] Figuring on this basis, the research firm showed that proper illumination and color was worth $139.25 annually, per worker.[4] This was figured as a company saving in money alone. There is no way to compute the non-monetary value of the new system to the thousands of employees affected.

Color is not something for industry to rush right into. It holds charm and magic, but restraint, control, and direction are necessary if color is to be used intelligently. To give free rein on color usage in a factory may completely destroy the benefits that could be gained under more careful control.

"Color is not an end in itself."[5] If it is to be used at all, it must be used with purpose and reservation.

One thing must be clearly understood. Factory decoration should not be confused with interior decoration. True application of color does not necessarily make people work harder and more accurately. The trick is to establish a color scheme which will cause better seeing conditions. In other words, color is not a bright, outstanding thing that stands out like a cheerleader, cheering the workers on. It subtly intergrates itself with the worker's seeing problem and directs his attention rather than attracts it.

If you have ever spent any time in your living room trying to compose a letter or paper, chances are that you will find it difficult to concentrate on your subject. Regardless of how attractive the room is, your mind will constantly wander. The results will be, due to the outside attraction, a slowly, and possibly, poorly composed article. This is an example of how draperies, furniture, and pictures attract, rather than direct attention. This also proves true in a highly decorative plant.

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[3]Faber Birren, **New Horizons in Color,** (Reinhold Publishing Corporation, 1955) p. 49.
[4]**Ibid.,** p. 50.
[5]Faber Birren, **'Color in the Plant,"** Factory and Management Maintenance, vol. CIII, no. 2 (1945), p. 144.

One of the major American oil companies allows the personnel to choose the colors that they prefer in their immediate work area. Although this may seem contradictory to the ideas already expressed, it is an altogether different situation. These workers are not required to remain at any one job for a long period of time. Because of this, their choice of color is more important than the standard, functional types used in more restricting jobs. By allowing them to choose, by vote, the colors they want, they get a feeling of importance and belonging.

The colors also serve a useful function. The orange storage tanks, formerly painted black, show the slightest signs of leakage. The workers, very proud of their selection of color, work hard to keep leaks from occurring and spoiling their color schemes.

"Bright colors in the interior create an outward attraction; soft colors direct attention inward."[6] Industry has almost unanimously decided to use lighter, more subdued colors in the interior. Industrial techniques try to avoid distractions as much as possible. Men, who are expected to concentrate on their job, find it easier to do so in surroundings of a grayish cast.

Very often—even more so lately—the use of color on ceilings has been discussed. This is possibly a big mistake. If the ceilings are attractive, workers' attention may be drawn from their work to the ceiling. If the ceiling is attractively painted, this will tend to draw attention to unsightly girders, pipes, and conduit which will now stand out like the proverbial "sore thumb".

In actual studies, the main causes of eye fixation are movement and extreme brightness. Under equal illumination, white has far less attraction than do hues. Unconsciously, the human eye seems to find hues interesting, while it shows almost complete indifference to white and neutral grays.

The Deering-Milliken Research center employs this technique throughout the entire work area. The walls are white with a small, black breaker strip to break the monotony. In the areas where it is practical, carpets of a grayish hue are used. Where carpets cannot be used, tile of a similar hue is employed.

The trend in modern mills is toward the gray walls because of their lack of attraction and resistance to dirt. Often the walls are dadoed. This is simply painting the lower portion of the wall a darker color, and the upper portion a lighter shade.

[6]Deane B. Judd, **Color in Science, Business, and Industry,** (John Wiley and Sons, Incorporated, 1952), p. 86.

The selection of the proper colors is of utmost importance. A large industrial plant had two cafeterias for the personnel. Both were painted different colors. One was a deep blue, and the other was a pale blue color. Although both cafeterias were thermostatically controlled and kept at the same temperature, the employees eating in the deeper blue one complained of it being cold. New slip covers, chairs, and draperies were added. By use of "warm" colors, complaints immediately ceased, even though there was no change in the temperature.

Machinery, too, must have a well controlled color sequence to be effective. With modern industrial plants purchasing new machinery almost constantly, care should be taken not to have a motley array of color. This will result in an effect of confusion and clutter, and prove to be a detriment in efficiency and quality.

Objects of minor importance, such as bins and racks, should be kept at a low degree of color purity so that they will not stand out. Color is scientifically concentrated about the work area. No attempt is usually made to give the worker what he wants or thinks he should have, as far as color is concerned. The problem is analytical. Those colors which are most conducive to efficiency and safety are used.

The case history of a radio tube manufacturing company illustrates how color came to the rescue of the workers. Precision welding, a very tiring task, is done by women. A color engineer realized that the task could be eased, both physically and psychologically.

The work benches were painted pale blue to give a cooling effect, thus counterbalancing the heat from the welding torches. The exterior and upper portion of the machine was given a coat of orange paint to contrast with the gas jets. The undersides were painted dark blue for better visibility of the parts being welded. The idea was well received by the workers. The foremen were so enthusiastic about the idea that they did most of the painting themselves, rather than waiting for the maintenance crew to get to their departments.

The results showed a great drop in rejects all in one week! Cleanliness was also improved because of the new pride that the workers showed.

"One thing is certain. Dollars spent in improving color and lighting always means greater safety and efficiency and they pay off in less waste and larger output."[7]

[7]Howard Kenchan, **Color Planning for Business and Industry,** (Harper and Brothers, 1958), p. 108.

A survey, conducted over a period of several years, showed that casualties, due to fire, were greater in plants using the conventional red and white exit signs than they were in plants using green and white ones. According to the survey, red tends to create excitement and panic. Green, on the other hand, had a soothing and calming effect, thus facilitating evacuation of areas in danger.

Rest rooms, smoking rooms, cafeterias, and dispensaries should be decorated for cheerful effects. Care should be taken not to "over do" this, though. If the room is too extravagantly done, the workers may get the idea of company waste or squander.

Standardization of colors for desired effects is still in a state of underdevelopment. Industry, as a rule, does use colors that have some degree of association as guides.

Safety equipment is usually painted red, orange, or yellow. These are excitable colors that bring attention to the particular hazard that they are used to prevent.

Protective materials, such as antidotes and first aid equipment, are painted blue or green. These two colors are soothing. By soothing the person who finds it necessary to use these materials, panic and shock is suppressed.

Valuable materials are usually marked in purple. This color suggests royalty and value.

PHI PSI MEMBERS ATTEND CONVENTION

By

Orren F. Hunter

Five members of the Iota Chapter, Clemson College attended the Phi Psi Convention in New York, May 29-30. Those making the trip were Aubrey Adams, Reggie Crawford, Sammy Fleming, Frank Hunter, and Gene Phillips.

Headquarters for the convention was the Hotel Roosevelt in Manhattan. The convention program included such things as job seminars, business meetings, sightseeing tours, and the annual banquet which climaxed the affair. The Clemson delegates were in good attendance at all these events and took an active part in all activities.

One of the highlights of the trip was a boat ride ride around Manhattan Island Friday night. The trip lasted four hours with the conventioneers being treated to refreshments and music by a Dixie-Land band.

The annual banquet closed out the Convention on Saturday night. After a delightful meal, the guest speaker, Mr. James Q. Dupont, presented a stirring speech on "The Nine Factors of Success." Afterwards, various awards were presented to chapters and individuals. Charles Bagwell, Secretary of Iota Chapter, received two of the three awards presented to individuals: one for the best written annual report and the other for the best reports submitted for the Phi Psi Quarterly.

As a whole, the convention was a great success and the ones responsible are to be congratulated. All of the Clemson delegates had a wonderful time and are looking forward to next year's convention in Washington, D. C.

N.T.M.S. News

The N.T.M.S. had election of new officers at the last regular meeting of the school year. The newly elected officers are:

President ____________ Tommy Ariail

Vice-President ____________ Harral Young

Secretary ____________ Steve Saunders

Treasurer ____________ Mickey Creach

The organization had a considerable increase in membership over the previous year, and plans are now under way for a successful year for 1960-61.

PHI PSI NEWS

The Iota Chapter of Phi Psi has finished a very successful year. During the year the chapter visited Deering-Milliken Research Center and Wunda Weve Carpet Company on a one day field trip. We were honored this year by a visit from the Grand Council President, Ben S. Bellemere, and Vice-President, Mr. Anderson, who joined us at a banquet at the Clemson House. We were fortunate to be able to send five delegates to the Phi Psi convention in New York. This is the largest number of delegates ever to attend the Phi Psi Convention from Iota Chapter.

REMINDER!

Summer short courses to be offered at Clemson College, School of Textiles for those in the textile industry.

The courses to be offered are:

Yarn Manufacturing—June 13, 1960

Fabric Development—July 11, 1960

Supervisor Development—June 13, 1960

Quality Control—August 15, 1960

Motion and Time Study—July 11, 1960

Cotton Classing—June 13, 1960

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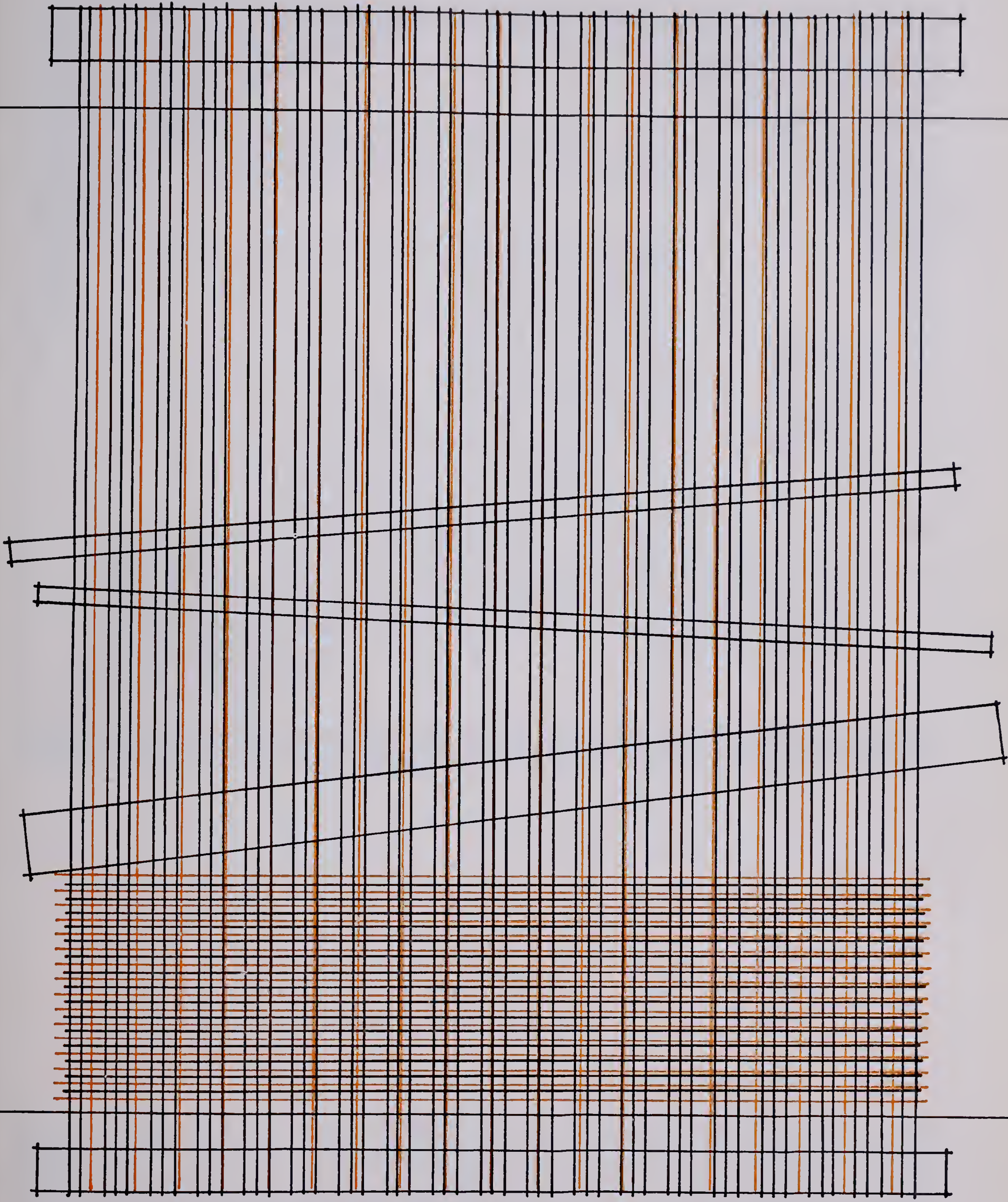

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CLEMSON COLLEGE FALL 1960

THE

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from the Editor

In this issue we have a very informative article on Textile Research at Clemson. This article on research is the first of several to be presented in future issues.

Waste control, a problem of great importance in the textile industry, is the subject of another interesting article in this issue.

The 1960-61 BOBBIN AND BEAKER staff seated from left to right: Ray Brock, Managing Editor; Tommy Ariail, Editor; Harral Young, Business Manager; Standing, Lewis Kay, Circulation Manager; David Rodgers, Advertising Manager.

Textile Research At Clemson College

By
David Gentry
Assistant Textile Technologist

A college or university exists for only two purposes: study and instruction. Of course, instruction is the phase with which undergraduates are most familiar since it deals with education and training. Yet, there must be provision for the re-examination of existing knowledge and the exploration of new areas in search of new facts. The college's other purpose enters here because a studious atmosphere which facilitates systematic study or research is provided. Here, then, is a college's purpose which is not encountered often by the undergraduate and which, at first glance, may seem incongrous with the seemingly only purpose of a college, that of education.

Since one of the ten textile schools in this country is located at Clemson, it is logical that Clemson College should promote research in textiles. It is a well-established fact that research has been the key to growth in all industries, and the textile industry is no exception. Research is assuming a growing importance in our industry because the low profit margin of textile manufacturer's necessitates the continual improvement of a company's competitive position if it is to survive. The three objectives of applied research—reducing cost, improving quality, and increasing productivity — furnish the manufacturer with information by which he can become more competitive. There is also a great need for basic research in textiles because there are many unanswered questions and unknown relationships in processing technology. It is encouraging to see increasing interest in basic textile research since this information is inherently the foundation for all real and revolutionary improvements which must come in the next decade. Many conclusions drawn in the past have been invalidated through experience or additional research simply because some basic relationship was unknown or ignored.

Textile research at Clemson is no new activity. Since the school's beginning, research and testing services have been furnished to the industry, and as a result, many improvements have been forthcoming. There have been a variety of improvements in textile machinery and developments of new and unusual concepts in processing technology. In processing, a notable contribution has been made in the electrostatic opening of cotton. Other developments have been accomplished in the design and development of textile testing instruments. Worthy of mention is the development of the Clemson Flat Bundle Tester, an instrument for determining the tensile strength of cotton fibers. Other efforts in improving fiber property measurements have been made and have usually been reported in such leading publications as the **Textile Research Journal.**

Because of an excellent Textile Chemistry Department, much research has also been done in the area of wet processing. Research in bleaching has benefited the industry through improvements in processing, while research conducted on small scale bleaching and finishing of cottons has supplied the industry with much-needed standards. Other important work dealing with the application of resin finishes to cotton goods has been a source of improvement in the wrinkle resistant properties of wash-and-wear fabrics.

All of this earlier research work has generally been performed by professors in the School of Textiles during summer months or other periods when the professor may not have had a full teaching load. Support for this work has come from the Sirrine Foundation, private industry, and the United States Department of Agriculture.

With the demand for textile research services increasing, the Dean of the Textile School, along with other members of the College administration, felt this demand could best be met through the organization of a Textile Research Department. Such a department was organized in 1958 and has now developed a full-time professional staff for preparing and supervising projects. This group is supported by a staff of laboratory and manufacturing technicians who carry out routine tasks. Both groups have continually expanded to keep pace with the increasing amount of work that has been forthcoming. Such

expansion is necessary to keep research work from being "mass produced", a factor which degrades the quality of the work done.

All of the work of the Textile Research Department is sponsored by private industry, foundations, and agencies of the state and federal governments. Large concerns with their own research departments as well as small concerns with limited or no research facilities have been served by the department.

The research staff is balanced over the various manufacturing phases of textiles so that projects in every area can usually be handled. In addition, the staff has available for consultation professional people in the technical areas of the entire College.

The physical facilities of the Textile Research Department have been developed and improved considerably since its beginning. Presently available are two processing laboratories in which temperature and humidity can be closely controlled. The availability of such space has been an asset in securing contract research work. Also at the research staff's disposal are two physical testing labs, fully air-conditioned, which are equipped with the latest electronic testing equipment as well as standard equipment which has been used in textile testing for many years. These testing instruments are valued in excess of $60,000 and do not include X-ray and microscopic equipment which is used, at present, only to a limited extent. Plans for individual laboratories for each of the Textile Chemists have been drawn up and construction should begin within the next few months.

Projects are currently underway which include evaluation of new physical testing methods, modifications in yarn processing, improvements in slashing techniques and weaving, and new techniques and processes in finishing. One project of interest is the development of stretch cotton yarns suitable to compete with the synthetic textured yarns used in hosiery and other wearing apparel. This project is sponsored by the United States Department of Agriculture through its Southern Regional Laboratory and will continue for some three years. Also, there are currently underway projects to improve the slashing of cotton yarns and to eliminate stream pollution problems created by the use of starch. In the very near future, work will be begun to evaluate the weaving performance of and properties of fabrics made from yarns spun in the USDA Pilot Plant located at Clemson.

The outlook for Textile Research at Clemson is bright. The industry leaders have begun to realize that the old "rule-of-thumb" methods once used are no longer adequate and are demanding research services. With its well-qualified personnel, modern equipment, and excellent physical facilities, Clemson is able to supply superior research services not found in any other institution.

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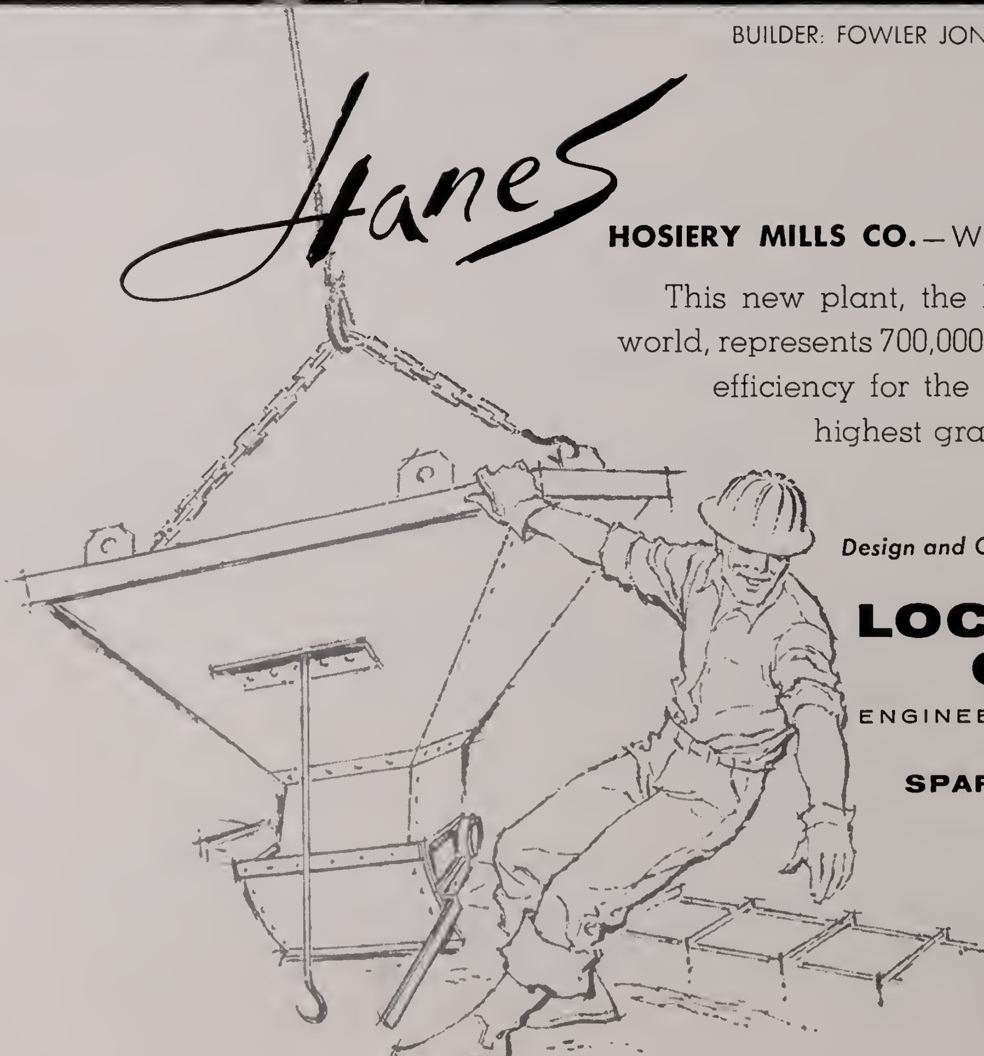


Dr. Martin Chanin

Dr. Chanin was born in Newark, N. J. He was graduated from High School in Newark and from there attended the University of Pennsylvania. He received his B. A. in Chemistry in 1942.

After graduation, Dr. Chanin worked for Hoffman-La Roche, a chemical manufacturing firm in Nutley, N. J., as a Junior Chemist.

After this, he enrolled in graduate school at the University of Michigan where he received his Master of Science degree in 1944 and his PhD in Pharmaceutical Chemistry in 1946.

Since this time Dr. Chanin has held many responsible positions such as Research Chemist for Humko (Memphis, Tenn.), Research Biochemist at the City of Hope Medical Center (Duarte, Calif.) and as a professor at four colleges. The colleges in which he has taught are Memphis State, Detroit Institute of Technology and Evansville College. At present, "Doc" is Professor of Textile Chemistry at Clemson where he teaches several courses both on the graduate and undergraduate levels.

He is, and has been, a member of several honorary and many professional societies.

Dr. Chanin is married to the former Dr. Margaret E. Jones, D. D. S. They have two sons, Phillip, age 12 and Bobby, 10.

Dr. Paul Edward Robbins

Dr. Robbins, the newest addition to the Textile Chemistry Staff, was born in Camden, New Jersey. He was graduated from High School in Haddonsfield, N. J.

In 1952 Dr. Robbins received his B. S. degree in Chemistry from the University of Pennsylvania. His graduate studies were conducted at the Georgia Institute of Technology where, in 1956, he received his PhD in Organic Chemistry.

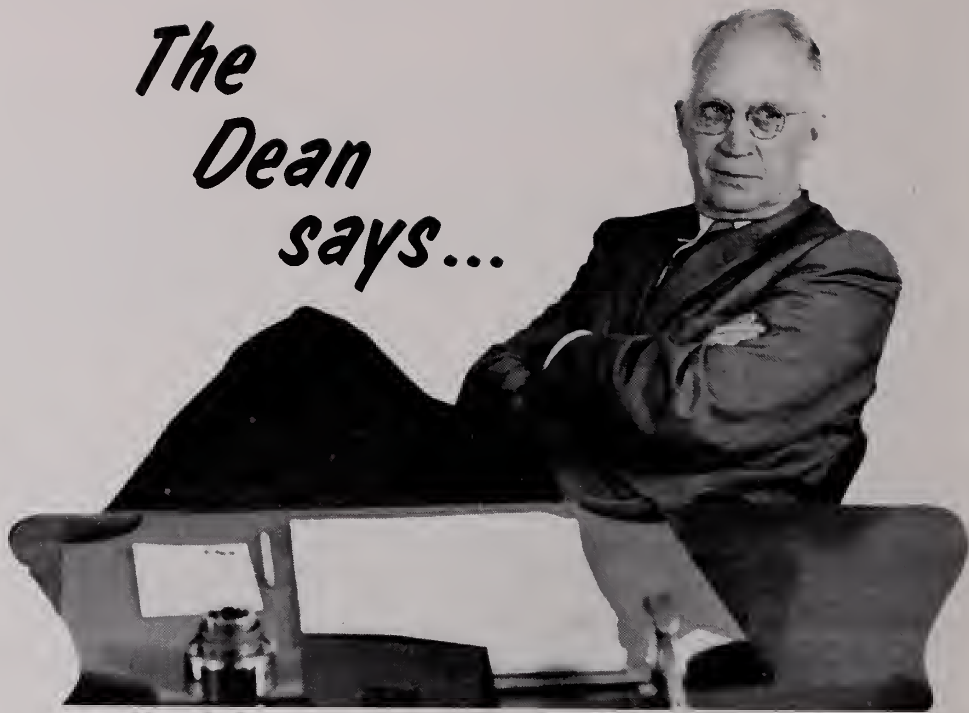
During his college days, Dr. Robbins was a member of Phi Lambda Epsilon, honorary chemistry fraternity, and Sigma Xi, honorary research fraternity.

Since his graduation, Dr. Robbins has held the position of Research Chemist in the Cellophane Research and Development Laboratory in the Richmond, Va., plant of E. I. Du Pont de Nemours & Co.

At present, Dr. Robbins holds the positions of Assistant Professor of Textile Chemistry and Assistant Textile Chemist at the Clemson College School of Textiles. Although most of his time will be spent in research, he plans to teach courses in Cellulose Chemistry and Polymers to graduate students.

Dr. Robbins is married to the former Miss Gladys Cordray. They have one child, Paul David, 14 months old.

The Dean says...



We are encouraged with the Freshman enrollment in the School of Textiles. Last September's new student enrollment in Textiles was 56, this September the new student enrollment fas 79, an increase of 41 percent. The total enrollment in Textiles is 300 this year compared to 266 last year. We had our smallest graduating class since the war in 1960. It looks like we are over the hump and headed in the right direction.

James Bailey, Vice President of Judson Mills, is Chairman of the Clemson Liaison Committee of the South Carolina Textile Manufacturers Association. This Committee had a meeting at the College on October 1st to make plans for the year's work. This Committee has assumed the responsibility of putting the textile story, including career opportunities, before the high school students of South Carolina, their parents, and their teachers. Please give this Committee what help you can.

The J. E. Sirrine Textile Foundation held its annual meeting here on Oct. 1st. I wish to express to the readers of the Bobbin & Beaker my personal appreciation and that of the faculty for what the Foundation does for the School of Textiles. I actually do not see how we could keep going without the Foundation's support, both financial and in good will.

During the past year Professor Richardson was awarded his Master's degree by North Carolina State College and Professor Marvin was awarded his Master's degree by Georgia Tech.

Professor Bratton Williams has rejoined the Textile School faculty after several years loan to the mathematics department.

Outstanding Seniors . . .

By
William E. Barrineau, Jr.

THOMAS M. ARIAIL

Thomas (Tommy) M. Ariail, age 21, is married and is presently living at Clemson. He is a Textile Engineering major. His hometown is Sevierville, Tennessee, where he has spent three summers working with the Cherokee Textile Mills, gaining valuable textile knowledge.

Tommy received the **Ada Hearne Foundation Scholarship**, which is a four year scholarship. With this aid and his summer's work, Tommy has been able to finance his way through college.

Thomas Ariail was an honor student the first semester of his sophomore year. He is editor of the "Bobbin and Beaker" and has served on the staff during his sophomore and junior years. He served in the NTMS during his sophomore and junior years, and at present he is President of the Club; **Phi Psi** during his junior year, of which he is now Vice-President; Council of Club Presidents during his junior and senior years; and Student Assembly, all go to make up Tommy's active college life.

ALVIN A. ADAMS, SR.

Alvin Aubry Adams, age 28, is married and has one son. He is a **Textile Management Major** from Union, South Carolina. Aubry worked with Monarch Mills, Union, South Carolina, from 1949 until 1951 and again from 1955 until 1957. He has also served four years with the United States Navy (1951-1955). During his summers from school, Aubry has continued his work with Monarch Mills.

Aubry was an honor student during all of his first two years at Clemson and a high honor student during his junior year. He belongs to the Union County Club and **Phi Psi**, of which he is presently President. Aubry also belongs to the NTMS.

During his years at Clemson, Aubry has received two scholarships: (1) Overseers Scholarship, (2) Owens - Corning Fiberglas Scholarship. Aubry is also on the G. I. Bill.

JAMES L. ADAMS, JR.

James L. Adams, Jr., age 21, is a Textile Science major from Spartanburg, South Carolina. He has spent five (5) summers working with Beaumont Manufacturing Company of Spartanburg.

James has been a high honor student during all of his years at Clemson. He is a member of Who's Who Among Students in American Universities and Colleges. He has won the Phi Eta Sigma Math award, the Chicago Tribune Silver Medal (R.O.T.C. award), the Quartermaster's Award (R.O.T.C. award) and the National Merit Award. James was a member of the Pershing Rifles during his sophomore year. He was a member of the Executive Sergeants (R.O.T.C. Club) during his junior year. He is a member of **Phi Eta Sigma, Phi Kappa Phi,** and **Phi Psi.** James is also in the advanced R.O.T.C. program.

He received the South Carolina Textile Manufacturing Scholarship, which pays 50% of his education.

Waste Is Costly

W. T. Eison, Superintendent

Excelsior Mill No. 3, Rutherfordton, N. C.

In an operation where the raw material is approximately 60% of the final product cost, any waste of this raw material is very costly.

This is the case in woolen manufacturing and therefore much emphasis is put on waste education, waste reduction and waste reprocessing.

This wool waste occurs throughout the woolen manufacturing operation and close observation and control over this waste is necessary at all phases of the manufacturing process.

The first chance of waste occurs during the picking operation. Any wool that drops out of the picker and is not picked up right at that time usually winds up in the sweep pile that also contains a lot of dirt, oil and foreign matter. This waste at picking occurs because of incorrect settings on the picker, improper feeding of the picker or through failure of the operators to keep the area cleaned up around the picking area. When thinking about this waste we usually think that this small amount would not be enough to bother with, and that we would spend more time picking up, being cautious and concerned than the waste would be worth. When we think like this we need to remember that the loss of just one (1) pound of this wool would cost as much as an hour's pay of the average picker tender. If the production of our picker is 2000 lbs. an hour, just 0.5% loss of the stock through waste would amount in approximately 5 hours to a weeks' pay for the average operator.

In the picking operation the waste is at the lowest cost because at this time we lose only the value of the wool. As the wool is processed to the next operation we have added a picking cost to the wool cost and therefore any loss of the stock at this point represents an even greater loss.

A larger amount of waste usually occurs in the Carding operation than at any other manufacturing operation. This waste is represented by; (a) card waste; that is the fly from the card and the droppings from the cylinders and doffers, (b) card strips; that is the stock that becomes embedded in the wire of the workers, strippers, cylinders and doffers and has to be stripped out at regular intervals, (c) card roving; that is made while getting the card threaded up and on correct weight, and (d) card sweeps; that is represented by the waste swept up in the regular floor sweepings.

These four categories of waste represent a tremendous poundage figure and therefore a very high cost figure. This figure can easily reach 10% of a weeks' production. A weeks' carding production figure of 30,000 pounds would mean 300 pounds of waste combined in these four categories of waste. With a raw material cost of $1.20 per pound plus a picking cost of .02½¢ per pound, this poundage of waste would represent approximately $3,675 per week. We can easily see why this waste takes on much importance to everyone.

In the carding operation as in picking, much waste occurs because of the improper settings on the card, improper speeds of the cards or sections of the cards or improper tending of the card.

In the spinning operation we classify waste as; (a) spinning roving, which is roving that is delivered from the card as satisfactory roving but does not get spun into yarn, (b) spinning hard ends or threads, which is spun yarn but for some reason has to be pulled off the bobbin, (c) spinning sweeps, which are very short fibers or stock that falls out during the spinning operation and good roving or hard ends that are dropped on the floor instead of being placed in designated containers. The total spinning waste can easily reach 5% of the weeks' spinning production. If 28,000 lbs. of yarn is spun from the 30,000 lbs. of carded roving then this spinning waste would amount to approximately 1400 lbs. This waste is valued at the original raw material cost plus picking and carding cost. This spinning waste is less than half the amount occured during carding, but the value of this waste has increased considerably.

In the preparation department we get waste in the warping and the winding operations. This waste is

in the form of hard ends or threads. The poundage of this waste is small when compared to the poundage resulting from the other operations but the full value of spun yarn is now lost. This loss can very quickly amount to a considerable sum.

In weaving we have the same type of waste, that is, hard ends resulting from improper filling or warps.

In all these greige mill operations waste is always made by the operators repairing breaks in the roving or yarn during the operation. The greater the number of ends coming down in spinning or the greater the number of stops in weaving, the greater will be the amount of waste made.

Another big loss occurs when the roving or hard ends waste is not put into the designated waste containers by the operators but instead is dropped on the floor and automatically is collected and classified as floor sweeps. As we discuss more about the utilization and disposition of this waste we can see the significance of keeping the waste properly segregated.

This covers the types of waste and points of waste occurrence throughout the greige mill operation. We can see the seriousness of this waste to any operation. What can be done to overcome this great loss?

One way we can combat this costly item is by setting up for each and every operation, waste standards. These standards are engineered and based on the actual operation and conditions of each machine, and on experience of previous operations.

In the case of waste resulting from the carding operation a standard amount of card waste, card strips and card roving is established for each type of yarn blend. These standards are used as a measuring stick of an efficient operation. If the standard amounts of waste are not exceeded by the actual amounts of waste made then the operation is well within control. When these standards are exceeded by the actual, then further emphasis should be given to this particular operation in order to find the reason for exceeding the standard amount of waste.

These standards are often reviewed to make sure they are a true measure or yardstick of what amount of waste could be expected in an efficient, carefully watched operation.

How an operation measures up to the standards set up for it, is watched very closely by the supervision and employees of each department because they know how serious it is, and how costly it is to the plant for any operation to go beyond the bounds of the waste standards.

The second way that this waste loss can be overcome to some degree is by the re-utilization of this waste.

A certain percentage of clean card roving can be put back in the blend, as raw stock, at the blending operation when an identical blend is prepared for use. The only loss incurred on this roving is the picking and carding cost.

Other types of waste must be reprocessed before it can be used again in the future blends. The card waste must be dusted in order to remove as much foreign matter as possible. Only a small percentage of this can be put back in the blends because of the very short fibers and the impossibility of removing all the dirt and trash.

The hard end waste and weaving head ends (very short woven strips) are processed first through a rag picker or garnett machine and then through a waste card. After these two operations these hard ends are again in fiber form and a predetermined amount is put back in future blends at blending.

This waste must all be kept separate as to type and components of the yarn so that it can go back in identical blends.

In the case of the largest part of the hard ends, the picking through weaving operating cost is loss, plus the cost of reprocessing, plus the cost of what amount of waste is lost completely during reprocessing, in other words, the yield of the operation.

The card strips, and all sweeps, can not be used at all because of trashiness, excess oil and lack of spinable fibers present. These two categories represent complete loss of the raw material cost plus the operation costs.

The third avenue of escape from this waste is one that is taken as a last resort and one that represents a big loss in dollars to the plant. The waste can be sold to waste dealers that specialize in using these waste products in many different ways. This selling of waste is much better than losing it completely but for every pound of waste sold, the plant must suffer the loss of the original stock, plus the operation costs for this waste, less the amount that is received for this waste. Any similarity between the original stock price and the price obtained for the waste is impossible, because it is not there. The wool roving, which represents the best form of waste that we have from our operation, brings a waste price that is about 40% of the original raw stock price.

Floor sweeps, when they were put in the blender at the first of the manufacturing operation, represented the high per pound cost of wool, but to the waste dealer the top price is ½c per pound.

At this point we come back to the previous mentioned importance of putting waste in the correct containers, and not dropping it on the floor. In weaving, hard ends that are put in the containers provided for them, can be reprocessed and reused in future blends. Hard ends that are dropped on the floor automatically go out of the department as floor sweeps and the ½¢ per pound from the waste dealer is the only return possible. Also, the waste dealer will put more value on waste that is separated such as 100% Wool or Wool/Nylon than he will on waste classified as "mixed", when no one knows what fibers it contains.

An efficient woolen greige mill will in 6 months, produce enough waste to keep the plant operating for two complete weeks, if it could be all converted back to raw stock. In other words, the pounds of waste made in 6 months represents 2 weeks usage of wool by the plant.

In other comparison figures the pounds of waste made in 6 months by our plant represents a dollar value large enough to pay the total payroll of our plant for approximately 15 weeks.

It does not take long to realize how important and how costly is each pound of waste made. Fortunately by using the waste standards to check on ourselves and on each operation and by reusing every pound of waste possible we are able to cut down on the loss represented by this waste.

Waste is a problem that requires constant supervision, constant counseling and constant work in order to check the large possible loss. It is a problem that offers large rewards and great satisfaction and merit to the individual who can help to solve it.

Webster defines waste as "worthless", and "unneeded", but another definition is needed for the woolen manufacturing plant, because waste is costly and to us waste means "money."

New Courses For Textile Curriculum

By
John G. Ferguson

TM 463, better known as seminar to the Clemson Textile School students, is a new senior course required for graduation from Clemson. Seminar meets only one hour each week and is a one credit course, but the seniors taking it, or juniors observing, will soon realize the value of this program. The purpose of the course is to bring about a closer understanding between the industry and the Textile School, as well as acquaint students with the various industrial problems.

Professor T. A. Campbell, Head of the Textile Management Department, is in charge of arranging for top industrial men to give talks on matters which are of importance and interest to use in the textile field. Thus far Donald Marshall, Division Manager of Draper Corporation, spoke on "Recent Loom Developments," and J. W. Jelks, Director of Industrial Relations for J. P. Stevens and Company, Inc., discussed "College Recruiting." Those students who were not present for Mr. Jelk's talk missed many valuable points on what companies are looking for in the textile industry. Mr. Fred Dent, President of Mayfair Mills was the third of thirteen speakers to be presented this semester. Mr. Dent's speech "The Textile Industry—State and National" covered the past, present, and future of our industries, problems and achievements.

The fourth speaker, Mr. Robert M. Jones of Saco-Lowell Research and Development Center made a very interesting talk on "Research in Textile Machinery" on October 18, 1960.

The Textile Seminar has been sanctioned by the South Carolina Manufacturers Association, The Sirrine Foundation, and the American Cotton Manufacturers Institute. Gaston Gage, Dean of Clemson Textile School and Robert C. Edwards, President of Clemson College, have stated that many leading men in the textile industry have endorsed this program.

New Book Review

By
William E. Barrineau, Jr.

TITLE: Fabric Structure and Analysis
AUTHORS: E. F. Cartee, J. C. Hubbard, Jr.

The purpose of this book is to acquaint the student who has a background of the foundation weaves, basic operation of different types of looms, and an elementary knowledge of fabric and yarn calculations, with the mechanics of applying this information to the development of fabrics. This may be accomplished in one of two ways. First, basic information such as constructions and yarn counts currently used by the producing organization are known. This, in conjunction with a sketch by a commercial artist or a sample to be reproduced, would be sufficient information for the production of a fabric which, in appearance, resembles the original. The second method is the actual analysis of a given fabric in order that this fabric may be reproduced the same as the original.

Generally, all the information for the reproduction of a fabric, from the original concept by a commercial artist or analyst, to the number of yards of cloth expected per pound of cloth, may be secured from a problem when carried to its completion. The information may be then forwarded to the appropriate department for use.

Phi Psi Iota Chapter News

By
Orren F. Hunter, Secretary

Iota Chapter began its new school year under the leadership of a new faculty advisor, Mr. David E. Gentry. Mr. Gentry succeeded Mr. E. A. LaRoche who resigned in May 1960. Mr. Gentry is a graduate of Clemson College and the Institute of Textile Technology, Charlottesville, Virginia. He formerly worked with West Point Manufacturing Company before accepting his present position on the Research Staff of the Clemson School of Textiles.

The first few regular meetings of Iota Chapter were concerned with making plans for the new school year. Topics of discussion were field trips, drop-ins, banquets, homecoming display and etc. The first banquet was held on October 31 at the Clemson House. The members of the fraternity, along with several members of the Textile School faculty, enjoyed a most delightful meal.

Iota Chapter is now in the process of taking in new members. New members that have accepted invitations are as follows:

Alman, Willie A.
Arnold, David A.
Bevill, John D.
Buchanan, Kenneth R.
Eubanks, Charlie E.
Guthrie, Norman C.
Hartzog, Robert C.
Holley, Clifton B.
Love, Thomas C.
Palassis, Constantine N.
Patrick, William L.
Templeton, Thomas W.
Wallace, David A.

A. A. T. C. C. News

By
Bruce Evans

The American Association of Textile Chemists and Colorists is an organization of all textile chemists from all over the nation. Through this organization chemists from various related fields present their research to their fellows.

The Association publishes a bi-weekly magazine, **The American Dyestuff Reporter**, which is widely circulated in the trade. Technical articles are present in each issue. Also, an annual yearbook is published, listing all new chemical and physical tests, a tabulation of American dyes, and a complete listing of textile specialties and chemical aids. These publications are invaluable reference works to the textile chemist.

Conventions held by the A. A. T. C. C. include a national convention, this year to be held in Philadelphia, and regional conventions, the nearest of which was held in Charlotte this month.

The Clemson student chapter of A. A. T. C. C. meets on the second and fourth Tuesdays of each month at 7:30 p.m. in the Phi Psi Lounge of the Textile Building. Officers for the year include Bobby Neal of Rock Hill, President; Terry Hunt of York, Vice-President; Stanley Rose of Camden, Secretary; and Tommy Templeton of Greenwood, Treasurer. Mr. Joseph Lindsay is faculty advisor.

The Clemson chapter has already visited the nearby Utica-Mohawk Finishing Plant this year, and several more field trips to various plants in the textile chemists's field are planned. All textile chemistry students, including freshmen, are invited and urged to attend the meetings on the second and fourth Tuesdays of each month.

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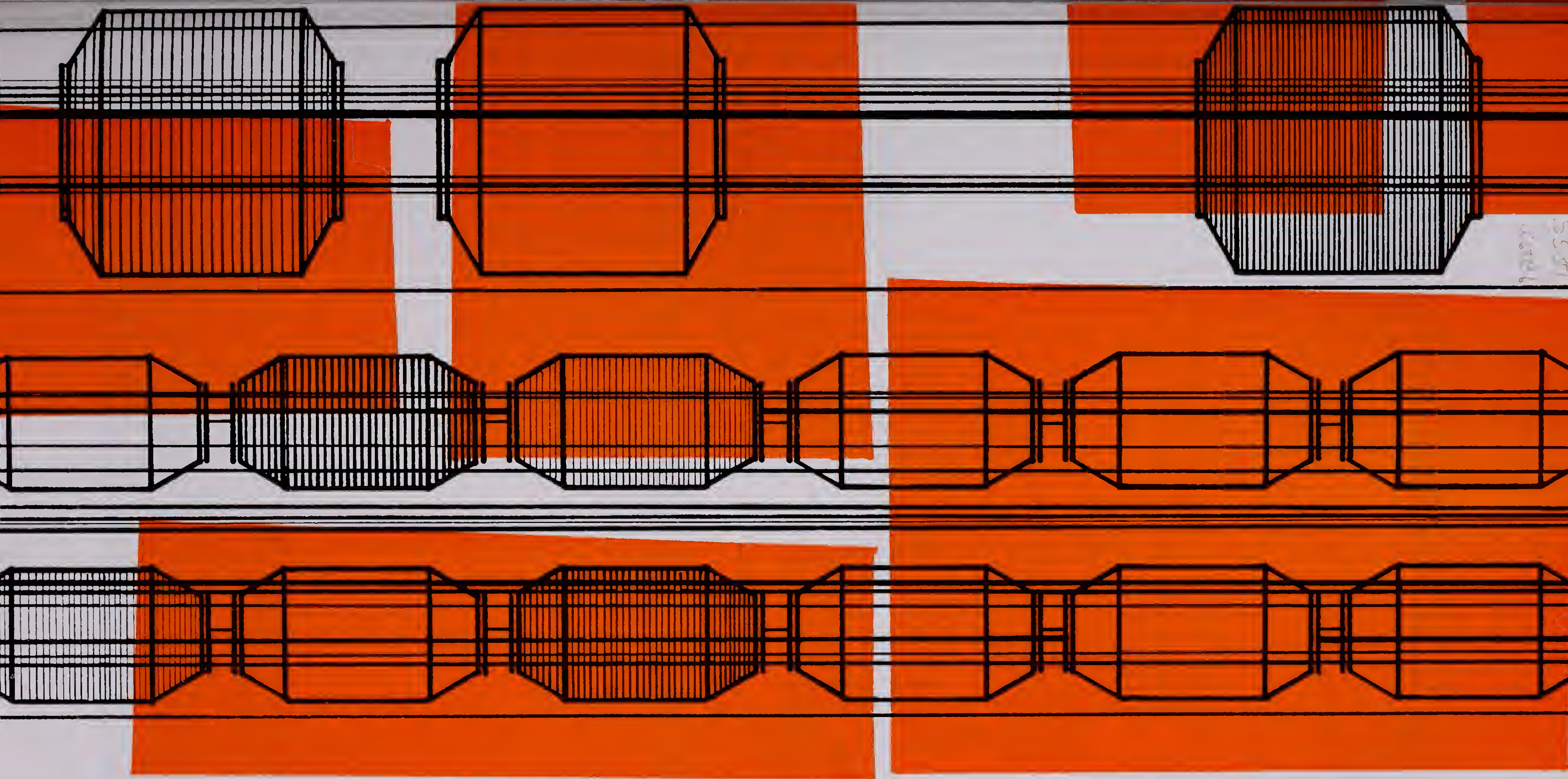

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CLEMSON COLLEGE

WINTER 1961

THE

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In This Issue

THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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from the Editor

Continuing our theme of research in this issue, we feature the Deering-Milliken Research Center. Also of interest in the research and production field are the informative articles on the Maxbo and Draper Shutterless looms.

The article on Warp Sizing is also of special interest.

The 1960-61 BOBBIN AND BEAKER staff seated from left to right: Robert Wall, Managing Editor; Tommy Arial, Editor; Harral Young, Business Manager. Standing, Lewis Kay, Circulation Manager; David Rodgers, Advertising Manager.

Deering Milliken Research Center

A century ago, the Industrial Revolution changed man's concepts of production and marketing for all time. Through the ages he had been creeping toward new economic and technological horizons, but, suddenly, he took a giant step forward—and his strides have continued to lengthen.

Today, what could be called the Research Revolution is taking place. The discovery and perfection of new ways to do new things with new products has been found to be the axis around which all progress revolves. New products, new processes, new markets in all fields are the key to both economic and physical survival in today's highly competitive business environment.

The textile industry, the first to take full advantag of the advent of the machine age, was slower in jumping onto the band wagon of research. An industry which had been undergoing dynamic change, textiles had been forced to devote its energies to adjusting to new concepts of marketing, production and pricing.

Today, however, the industry is making rapid strides in research and leading it is the Deering Milliken Research Corporation at Spartanburg, S. C., the largest and most comprehensive operation of its type in the industry.

Founded in 1945 as the Deering Milliken Research Trust, the research group's first home was a small brick bungalow on the banks of the Seneca River, just across from the Clemson College campus. Employing a half dozen persons, its administrative offices were in the living room, a machine shop in a bedroom and a spinning laboratory in the kitchen.

After a few months in these makeshift quarters, the research group moved to the basement of the textile school building on the Clemson College campus, where it remained another year and a half.

The next move was to Stamford, Conn., where the research activities were centered until 1950. In that year, it was moved back to South Carolina and located at Pendleton, four miles from Clemson, until its multi-million dollar building was erected on the outskirts of Spartanburg in December, 1958.

In 1955, the organization became known as the Deering Milliken Research Corporation. The stock of the corporation is owned by 28 mills representing practically every phase of textile production.

The research carried out by the corporation is geared to the development of new products, processes and machinery for all aspects of the textile industry. The corporation's staff includes chemists, physicists, mechanical engineers, electronic engineers, chemical engineers, patent lawyers and a number of technicians.

An example of the breakthroughs accomplished by Deering Milliken Research scientists and engineers is the development of BELFAST self-ironing fabrics—the first and only successful attempt to impart permanent wash and wear qualities to cotton by an actual chemical modification of the fiber itself.

This significant development is as great an improvement over previous wash-and-wear cottons as was the introduction of resin finishes to give drip-dry properties to this fiber.

BELFAST cottons have a wet-crease recovery characteristic which makes them the first of the wash and wear cottons able to be spin dried in a home laundry without having wrinkles set into them.

Since the processing of these fabrics involves an actual chemical change of the basic fiber, these properties remain for the life of the fabric—BELFAST fabrics are not the result of a finish which can wash out after repeated launderings.

Add to this the facts that BELFAST fabrics are not chlorine-retentive so that any type of bleach may be used without fear of yellowing; are permanently shrinkage controlled; are odor free; release dirt and soil more easily than other fabrics during washing, and have excellent dry crease resistance, and the importance of their development will be obvious.

The key to the processing of BELFAST fabrics is the chemical cross-linking of the microfibrils within each individual cotton fiber. This essentially provides elastic bonds which enable the fibers to snap back to their original shape while wet.

Similar strides have been made in the development of man-made fibers by the scientists and engineers of Deering Milliken Research with the perfection of the process for the production of AGILON edge-crimped yarns.

These textured yarns, usually produced from nylon or polyester filament yarns but theoretically adaptable to any thermoplastic filament, have entered the commercial market in a number of end-products. Already AGILON yarns are found in 60 per cent of the women's seamless stretch hose mar-

keted today. They also can be found in such products as lingerie, sweaters and men's hose. Heavy-denier AGILON yarns have been used in carpets and upholstery fabrics.

The product of a strictly mechanical process, AGILON yarns are produced by heating the filament yarn and passing it over a blade to form a series of coils. The process is basically similar to that used to produce a decorative gift wrapping by passing a ribbon over a scissors blade.

In the finer deniers, this process primarily gives filament yarns additional stretch properties while in the medium and heavy deniers it mainly imparts bulk.

In the mechanical field, Deering Milliken Research engineers have developed the full-frame automatic doffer which drastically reduces the down-time of spinning frames from that required for manual doffing.

The full-frame doffer picks up empty bobbins at a central loading station, moves overhead to the frame, lifts full bobbins of yarn from the frame simultaneously and replaces them with empty bobbins in another single motion.

The doffer then returns to the loading station where it deposits the full bobbins and picks up another loads of empty ones, which are fed automatically to the station. The actual doffing operation is accomplished by pneumatically controlled rubber-lined graspers.

But not all work at Deering Milliken Research is as close to actual product development as BELFAST fabrics, AGILON yarns and the full-frame doffer—many of the projects undertaken are in terms of the most basic research which may lead through many paths before it reaches the product stage.

Taking part in this research are many scientists whose backgrounds are in the pure chemistry and physics fields, rather than in applied textile sciences.

These men are working with the "whys" and the "what happens" of textiles processing. Instead of dealing with yards of fabric and gallons of finishes they are concerned with what happens to the indididual fibers—even down to the molecules and crystals within them—when they undergo various processes.

To make their studies as thorough as possible, they have some of the most modern analytical equipment available. This includes infrared, ultraviolet and visible light spectrophotometers, X-ray diffraction and fluorescence equipment, and election microscope and many more basic analytical tools.

One of the laboratories at the Spartanburg Research Center is devoted to the development of elec-

tronic equipment for textile processes. As the industry moves closer and closer to full automation, this branch of engineering is depended upon more and more for controls and instrumentation.

A complete fabric testing laboratory, capable of conducting standard tests for practically any physical quality of fibers, fabrics and yarns is an integral part of the research operation. Not only is this used to evaluate new developments of the research group, but it also is a key part of the DMRC quality control program. Under this program, licensees of the corporation's patented processes are constantly checked to assure that they maintain the high standards set for products bearing the trademarks owned by DMRC.

The operations at the Research Center do not stop with the birth of an idea however, Extensive development takes place before a new process is declared ready for use.

In a separate 20,000 square foot building at the Spartanburg site are three pilot plants, as well as a fully equipped machine shop for the construction of prototype models of new machinery developed by DMRC engineers.

Two of the pilot plants are devoted to filament yarns and are equipped with spinning, weaving and knitting machinery on which these yarns can be made in various constructions.

Naturally, much of the work in this area is concerned with the further development of AGILON yarns for use in a variety of end products.

The third pilot plant in this building is set up for the finishing of fabrics. The equipment in this area is the most modern and versatile obtainable since, as research is directed along different lines, it may be called on to handle practically any type of fabric or finishing process.

Since much of the work at DMRC today, is concerned with the development of new wash and wear finishes and particularly with the BELFAST self-ironing fabrics, this is one of the busiest spots of the entire research complex.

In addition to the filament yarn and finishing pilot plants, a chemical engineering pilot plant with which the DMRC staff will expand its development in the field of processs chemical production is rapidly nearing completion—evidence that research is a constantly expanding process which embraces many fields.

An integral part of the research corporation's operation is its product development group. The staff of this department is primarily concerned with the furnishing of technical assistance to licensees of DMRC processes, aiding them in starting production in their own mills with their own equipment.

Another function of this group is the supervision of the quality control program to maintain the high standards required of products bearing DMRC trademarks.

In addition to the work carried on in the laboratories and pilot plants at the research center, there is another important aspect to any research program —the assembling of information from many sources. In the technical library at DMRC, a basic collection of books in all areas touched on by research projects carried on at the center is maintained. Technical periodicals from throughout the world are received regularly to keep the scientists and engineers aware of the latest developments in their fields.

It would, of course, be impossible to have on hand all of the material that might be needed so a major function of the Research Corporation's trained librarian is the securing of information for the research corporation staff from other sources. An extensive program is carried on with other libraries, involving the borrowing of materials and utilization of photocopies and microfilm of desired articles, to avoid expensive duplication of materials.

Since the Deering Milliken Research Corporation does not manufacture any of its own developments but licenses them to manufacturers throughout the world, it must depend on the royalties from the use of its patented machines and processes for its support. To handle the world-wide patenting, licensing and trademark program of the Research Corporation, a staff of four patent lawyers is maintained.

Their important duties range from the policing of trademarks to the filling of patent applications and the licensing of manufacturers to use DMRC-developed machines and processes.

Research is a big word today and nowhere is it bigger than in the textile industry where research and development is not only necessary to meet competition but essential to survival.

Deering Milliken Research Corporation, which has set the pace for others to follow, is determined to keep its place by blazing new trails.

A successful invention or development is not an end in itself; it usually opens new avenues for exploration. As these new roads are opened, DMRC researchers constantly are expanding their efforts to develop new products to meet more successfully the needs and demands of the producers and consumers of textiles.

Have You Changed Your Address Lately?

By

Norman C. Guthrie
Junior Staff

If you have, we here at the "Bobbin & Beaker" would like to find out about it!

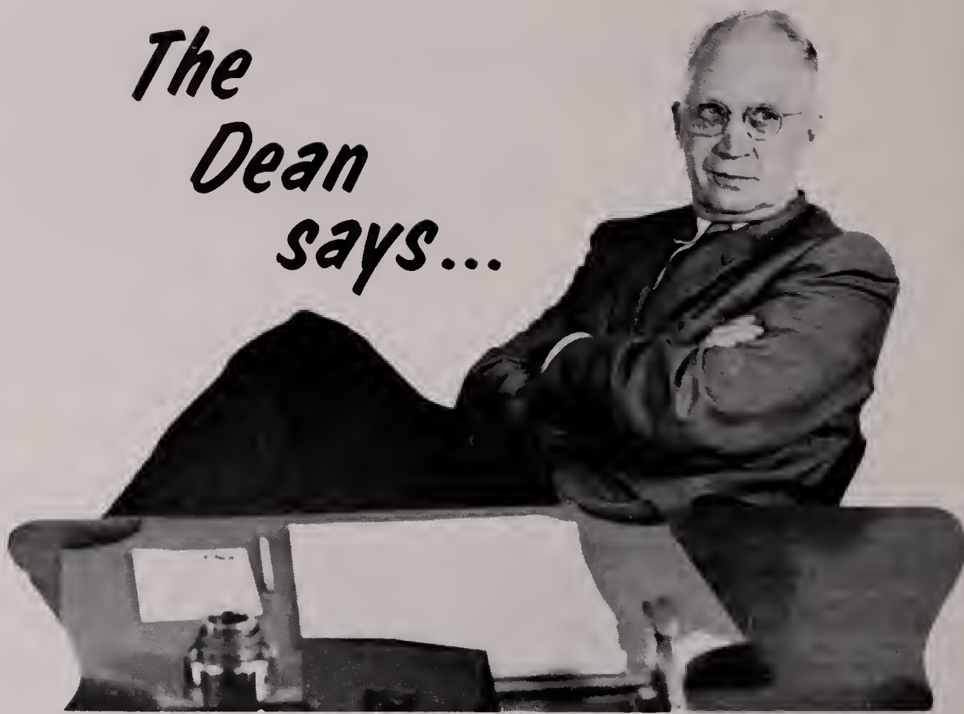
On the last several issues of the "Bobbin & Beaker" we have had anywhere from fifty to seventy-five issues returned. These issues came back from addresses that we have on file where the addressee has either moved or has in some way changed his mailing address.

Our mailing budget is run on a very tight schedule and we would more than appreciate any cooperation that you, our readers, would give us when you change your address.

We, the students of the "Bobbin & Beaker" staff, want everyone to receive a copy of our publication who is interested in Textiles, and Clemson. We, however, can not send you our magazine unless we have your correct address. So please help us out!

If you have recently changed your address, please send your correct address to "Bobbin & Beaker", School of Textiles, Clemson College, Clemson, S. C.

The Dean says...



And speaking of visitors, we are constantly having large groups of visitors to tour our facilities. Last fall we had the South Carolina county agents. Before that we had about 70 county agents from Arkansas and Missouri. As this is written we are expecting about 90 people from a meeting of the National Cotton Council. These tours are usually in cooperation with the American Cotton Manufacturers Institute and are designed to acquaint various groups with the intricacies of the textile industry. Many people in the fringe areas, especially cotton production, know practically nothing about textile manufacturing.

For the fourth summer the School of Textiles is offering a short course program for those in the industry and related fields. Each course will last three weeks and will be a full time program. The lectures will be in the mornings and the afternoons will be occupied with laboratory work or with work in the library.

Two courses, Yarn Manufacturing and Fabric Development are especially recommended for college graduates, other than textile school graduates, who will be entering the industry in June. This program will serve well, regardless of what phase of the industry they enter. It will be ideal preparation for those entering a training program or for those going into the various staff jobs. High school graduates who have mill experience and have attracted the attention of management will benefit.

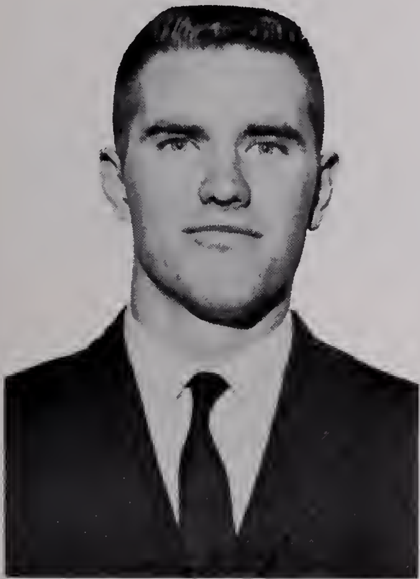
Other courses are Supervisor Development, Qualty Control and Time and Motion study. The last two are for those people who find themselves in this phase of work with no formal training in the field. The Supervisor Development course is designed for the first line supervisors to acquaint them with the complex features of their job.

If interested in any of these, write to me for further information. The cost is $75.00 per course class fee, and room and lodging can be had in the college dormitory for $50.00 for three weeks.

We have many former students to drop in to see me and other faculty members. We are always glad to see you. Sometimes we can solve some small problems for our alumni.

Outstanding Seniors . . .

By
William E. Barrineau, Jr.



A. DAVID RODGERS

David Rodgers is a Textile Management major from Georgetown, South Carolina; he is 21 years old. David received honors during the first semester of his freshman year. He is also the recipient of the Seydel-Woolley and Company Scholarship.

David is the Cadet Colonel of the Army ROTC Corps at Clemson; Advertising Manager for the "Bobbin and Beaker"; and the President of Scabbard and Blade. He is also a member of Blue Key, the Tiger Brotherhood, the Numeral Society, and PHI PSI. During his junior year, David was the Organizations Editor of the "Taps", and this year he is the Editor of "Taps". He was a member of the Pershing Rifles, the 4th Regimental Pershing Rifles Headquarters Staff, and the CDA Junior Staff.

W. HARRAL YOUNG, JR

W. Harral Young, Jr., is a Textile Management major from Sumter, South Carolina. He is 21 years old. Harral received honors during the second semester of his sophomore year and during the first semester of his junior year. In the textile industry, Harral has worked two summers with Santee Print Works, Sumter, South Carolina, and during the past summer, Harral worked with the Pacific Division of Burlington Industries in Lexington, North Carolina.

To aid with his college expense, Harral received the Carolina Yarn Assistance Scholarship during his junior year, and the Keever Starch Scholarship during his senior year.

Harral is Vice-President of N.T.M.S., Business Manager of the "Bobbin and Beaker", Treasurer of PHI PSI, and he is the Hall Counselor of D-6.

ORREN F. HUNTER, SR.

Orren F. Hunter, Sr., age 26, is a married student from Bamberg, South Carolina. Frank is a Textile Science major. He received honors during both semesters of his sophomore year. In the textile industry, Frank has worked with Amerotron Woolen Plant, Barnwell, South Carolina, for one summer, and the Amerotron Plant, Williamston, South Carolina ,for one summer.

Frank received the Textron Foundation Scholarship, which is a four year scholarship. During his senior year, he received the David Jenning's '02 Memorial Scholarship. Both of these financial aids have aided Frank in attending Clemson.

Frank is a member of PHI PSI of which he is Secretary. He is also a member of N.T.M.S. Frank has served 8 1/2 years in the South Carolina National Guard.

The Draper Shuttleless Loom

Draper Corporation has been continuously engaged in the manufacture of improved machinery for textile mills since 1816, and at this time, they are the world's largest builders of automatic looms. The development of the Draper Shuttleless Loom referred to as model DSL, marks a departure from conventional weaving for the North American textile industry that is so radical that it can only be compared to three previous loom inventions. The first was John Kay's fly shuttle development in 1733; the second was Cartwrights power loom dating from 1789; and the third was James Northup's automatic bobbin changing attachment patented in 1890. The last of these significant developments was made under the auspices of Draper Corporation; and the first so-called Northup looms were sold to the Queen City Cotton Mills, Burlington, Vermont in August, 1894. There were 792 looms in that order. Since that time Draper Corporation has built over 760,000 and have delivered them to mills all over the world.

The formal beginning on the development of a shuttleless weaving machine commenced in 1945, although considerable thought had been given to it prior to that date. As the first step the company investigated all of then-known shuttleless weaving principles (on which there are U. S. patents dated as early as 1866), and as a result of this, elected to attempt the breakthrough with a modification of the rapier principle. This means of inserting the filling yarn into an open shed appeared to the Draper Corporation to be the most practical approach to a machine for their traditional market—the area of mass produced single shuttle fabrics.

The Draper Corporation is now 15 years further down the road with research and development expense of more than six million dollars behind them. The first production unit of 45 looms was installed in a Southern mill in early 1957, weaving Class B Sheeting at 226 picks per minute. By the end of this year, they will have over 1700 DSL looms running on commercial production in thirteen different mills. The Draper Corporation is presently building these machines at the rate of 100 per month, and they are still in the process of developing and installing production tooling for higher rates.

The goals which the company has set for the shuttleless loom are as interesting as the machine itself. Their targets for the average weaves are:

a. A 40% increase in speed

b. A 40% increase in the weaver productivity

c. A 100% increase in fixer productivity

d. A 70% decrease in the cost of maintenance, repair and operating supplies

e. Complete elimination of battery hands

f. Other advantages will include:
   - A reduction in materials handling
   - A reduction in cost of filling preparation
   - A reduction in power consumption
   - A reduction in waste
   - A reduction in noise level

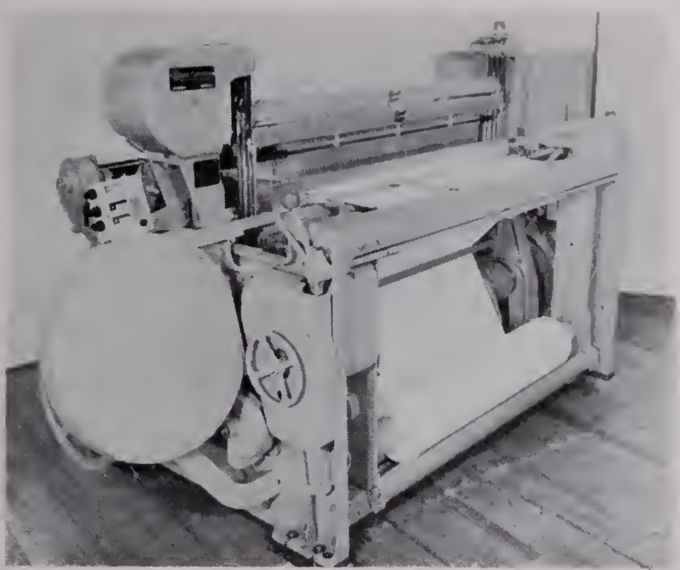
To date the loom has performed most satisfactorily on medium to coarse spun yarn fabrics. Installations now operating are weaving Class B Sheeting, Canton flannels, drills, muslins, percale sheeting and styles from print cloth yarn numbers. The Draper Corporation is actively experimenting with a wide range of fabrics from combed lawns to denims, including those made from continuous filament yarns, and are confident that the loom will ultimately handle a large percentage of all single shuttle weaves.

The cost of the machine is roughly $2800.00 compared to $1800.00 for a comparable fly shuttle loom. Their studies indicate that the economics favor fabrics in the medium to coarse range and a rough estimate the pay back in this area would be about five years, although many constructions will show a better return than this.

The Draper Shuttleless Loom shown in this article is of the flat or broad loom type, producing a single sheet of fabric in widths ranging from 36" to 64", at speed of approximately 220 picks per minute in the wider widths. Usable reed space is 5" greater than nominal size of loom.

The loom as you can see, is low in silhouette, without a handrail over the reed. This makes for easier weaver's operation. Its overall floor space requirement is somewhat less than a Draper X-2 Model of corresponding size but depth front to back is 7" to 9" less than a corresponding X-2 Model, depending on warp beam diameters.

The principal difference between this loom and the conventional fly shuttle loom is the method used in placing the filling in the shed.



Filling supply packages are in the form of cones, preferably of 8 to 9 pounds in weight, mounted at the right hand end of the machine so that two cones can be creedled together to effect a continuous supply of yarn.

Filling insertion or "picking" is accomplished by two sets of mechanisms (1) the filling control mechanism and (2) Right hand and Left hand Filling Carriers.

The Filling Control Motion is located on the right side of the loom. By means of cams, this mechanism positions, then measures and cuts the yarn so that the correct length of filling can be drawn under tension into the warp shed by the filling carriers.

The Right and Left Hand Carriers which place the pick in the shed are mounted on the ends of flexible steel tapes, and work in and out of the shed from opposite sides of the loom in a modification of the old "Rapier" principle.

In the Draper loom, each carrier tape is fastened to an oscillating aluminum wheel. As the aluminum wheels turn the carriers enter the open shed (one from each side) and mate in the center. The Right Hand Carrier which has picked up the yarn from the filling supply, transfers it to the Left Hand Carrier near the center of the goods. As the tapes withdraw from the shed, the Left Hand Filling Carrier pulls across the shed the loose end of filling which has been correctly measured by the timing of the filling cams.

On the DSL the filling is laid in cycles of two picks. The two picks resemble a hairpin with the open end at the left hand side and the bend at the right hand side. This produces a fabric with a smooth or uniform selvage at the right hand side and an unfinished selvage at the left hand side.

Beat-up of the pick is by means of a cam operated, all metal reed mounted on a light metal lay beam which is supported by light metal swords. No crank shaft is used. Lay operating cams are designed with a dwell of nearly one-half the cycle to allow for the entry into and the withdrawal from the shed of the filling carriers.

The loom has a capacity of six cam operated harnesses. No dobby or jacquard applications have been developed at this time. The harness motion features several departures from cam harness motions commonly used on fly shuttle looms.

As mentioned earlier, this loom produces a conventional selvage on the right hand side of the goods.

A very satisfactory left hand selvage is made possible by a selvage binder mechanism with separate selvage yarns. The binder ends, one on each spool mounted on a revolving disc, lock the free filling ends with a motion completely independent of the loom harness motion. For every revolution of the binder disc, the two ends of the binder yarn cross each other twice. This produces a binder cord of the outside wrap ends—in effect, a full turn leno—and can be set to bind every filling pick or every two picks. The edge left by the filling ends projecting beyond the binder cord can be sheared or trimmed in a number of ways to produce a relatively smooth edge. These ends can be held to 3/8" in the loom, and the waste resulting is no greater than the waste from feller bunches on bobbins.

Maxbo Shuttleless Loom

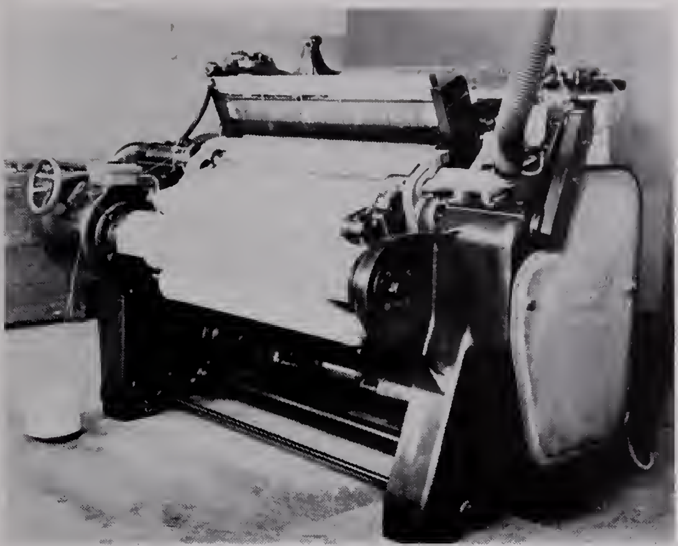
Production is the most important feature of the Maxbo Shuttleless Loom, but not at the cost of quality. This revolutionary loom has picking speeds of between 320 to 400 per minute as compared to an average of 185 per minute on the conventional loom. This is accomplished through a unique way of inserting the filling, a shorter stroke of the lay, and less stress on the warp threads.

In the Maxbo Loom, the shuttle is replaced by an air nozzle from which a concentrated jet of air is ejected to blow the filling thread through the shed. The filling is inserted from one direction only—from left to right. Filling yarn is provided by a magazine of two large capacity cheeses. The thread is drawn from the cheese onto a measuring drum which is preset to draw off the amount of filling for the width of cloth to be woven. The air blast is very short but powerful enough to blow the filling through the shed. A suction nozzle is located on the opposite side of the shed to receive the thread. A clamp catches and holds the outgoing pick so that the thread remains stretched. A simple but effective pick detector at the feed end ensures that the thread is blown through the shed.

After the pick has been laid the beat-up must follow. This is another advantage of the Maxbo. Since there is no shuttle to pass through the shed, the movement of the lay is considerably shorter. It is now approximately 5 1/4 inches. This shortens the beating-up cycle which is one of the changes from the conventional loom that attributes to the Maxbo's high speed. As there are no shuttles to rub against the reed of the Maxbo Loom, the reed dents are consequently made thinner than normal and with an increased lateral resilience. Reed marks are made less noticeable in the cloth.

Many parts of the shedding motion have been eliminated to allow the harnesses to move at this extremely high speed. The harnesses are slanted forward at an inclined plane in a harness rack. The movement comes from steel lifting rods fastened to the bottom of the harness frame and connected to treadle arms. The lifting rods are operated by two sets of synchronized cams that are enclosed in an oil filled case. The high speed of the harnesses would cause excessive end breakage on the conventional loom; but Maxbo has increased the distance from the fell of the cloth to the tip of the warp beam from approximately 2 1/2 feet to nearly 3 1/2 feet. This increase in distance allows a far more elongation of the warp beam. This increased elongation decreases the tension on the warp yarn thereby decreasing the end breakage due to weak or thin places in the warp. This increase in distance also helps the weaver. Because of the increased speed of the harnesses a constant warp tension is necessary. The warp beam regulator operates entirely automatically and does not require setting. It is actuated by the tension beam and retains a constant warp tension from the loaded to the emptied beam. The warp tension is set by means of tension springs.

The selvage on the cloth produced by the Maxbo is fringed. This is due to the filling being inserted from left to right only. The pick is held by a filling holder on the right hand side of the loom while shears cut the filling on both sides of the loom. The approximate 1/2" of waste filling, which occurs after the cutting of each pick, is drawn off to a central collection point by a vacuum tube. This vacuum tube also holds the filling in place and retains the twist in the yarn until the filling holder comes in contact with the filling. The selvage could be tucked in but this causes a build-up on the roll which gives trouble both in finishing and cutting operations. On the tucked selvage there are twice as many picks per inch in the selvage as there are in the body of the cloth.



Production is not the only facet of this revolutionary loom. The Maxbo Loom has a lower operating cost than the conventional loom. This is obtained by elimination of many parts. The new revolutionary method of inserting the filling eliminates the cam shaft, picking cams, pick balls and levers, rocker shaft, picker sticks, pickers, benders, parallel feet, box fronts, hold-up straps, lug blocks, leather, check straps, bumbus, lay-plates, shuttles, batteries, and filling quills. The elimination of these parts greatly reduce the work of the loom fixer, and the cost of replacing worn out parts.

The protector motion, an expensive maintenance item, is no longer needed. It is impossible for the Maxbo Loom to produce a smash because there is no shuttle. Smashed or torn up reeds are also eliminated for the same reason.

The elimination of the picking motion greatly reduces the vibration of the loom. A coin can actually be balanced on its edge while the loom runs at its high speed. The lay of the Maxbo Loom is dynamically balanced—thus aiding in a greater reduction of vibration.

The new lubrication system results in a cleaner cloth being woven. No outside oil can be blown onto the warp or cloth. There is an oil reservoir in the bottom part of the left hand loom side. Submerged in this reservoir is an oil filter with a line running to an oil pump. This pump lubricates all the moving parts of both ends of the loom. There are seven (7) other grease fittings that need additional attention only once a year.

The Maxbo Loom can run up to eight harnesses with full selectivity of the harness cams. Yarn as fine as 40/1's and as coarse as 5.50/1's has been sufficiently tested at the same high speed on four, six, and eight harnesses.

The approximate floor space required is 4 ft. 7 inches x 7 ft. The loom weighs 3100 pounds and is driven by a 2 1/2 H.P. motor.

The manufacturer of this loom expects the following results from its operation:

1. Increased production.
2. Fewer stops.
3. Reduced maintenance.
4. Quieter running.
5. No lubrication or attendance, and less risk of accidents.
6. Higher construction can be woven without pick packers.
7. No fringe shearing required after weaving before finishing.

The Maxbo Loom was invented in Sweden by an Esthonian engineer. Edda International Corporation is the selling agent.

The Importance of Temperature Controls in Sizing

For efficient weaving, cotton warps of single yarns, yarns must undergo the process known as sizing, dressing, or slashing. The three terms are used exchangeably to designate the application of a protective reinforcing film to the warp yarns which will enable it to withsand the abrasive and chafing action of weaving. The sizing process consists in impregnating the yarn with a film—forming compound of various ingredients in a machine called a slasher.

The fundamental purpose of sizing any warp is to provide one or more of the following requirements:

A—Weavability, B—Weight, C—A given finish or blend. However, the primary purpose of warp sizing is to produce weavability. No matter what other properties slashing may give to the yarns, as hand, stiffness, tensile strength, or weight, if these are done at the expense of weavability, the sizing has not served its purpose. The ideal size should leave the desired weight on the cloth, give it the proper hand or feel, and at the same time eliminate warp breaks during weaving.

Percy Been, the English Textile expert, said a quarter of a century ago, "Sizing is the most important preparatory process to which cotton yarns are subjected previous to their being woven into cloth."

The objects to be obtained in the sizing of warp yarn where application of size is only for the purpose of enabling a warp to be woven satisfactorily are:

A. To cause the sizing solution to penetrate the structure of the yarn to an appreciable extent in order to increase the cohesion of the individual fibers of the yarn and thus increase its strength.

B. To coat and smooth the outer surface of the warp yarn and thus enable the warp to resist the chafing and abrasion that are inevitable during the weaving process.

Good slashing depends, to a marked degree, on the maintenance of a uniform level of the size in the size box of the slasher, a uniform temperature of the size, a correct and uniform temperature of the drying cylinders, and the constant use of the same size formula and size-cooking procedure. Of these, we are most interested in temperatures and their effect upon sizing.

Sizing is the process of applying to yarns or threads a film or coating of an adhesive material which, when dry, forms a smooth, hard, but pliable surface that encases the yarns and tends to bind the projecting fibers of the yarn close to the yarn surface. Sizing is generally composed of materials that will impart to the size mixture the ability to adhere to the yarn firmly and form a smooth surface, or film, around it.

The materials composing a size mixture may vary slightly but essentially they come under the same classifications. Practically all size mixtures are composed basically of an adhesive, a softening agent, and a gum. Miscellaneous materials, such as antiseptics, preservatives, anti-foaming agents, chemical, etc., are sometime added.

A size mixture is prepared by first running an accurately measured amount of cold water in the cooking kettle. To this is added a measured weight of starch. The mixture is then stirred thoroughly in the cold water for about ten minutes to break up lumps and wet out the granules. Steam is then turned on and the temperature of the solution begins to rise. The compound and other ingredients should not be added until the heated starch solution has reached a temperature of 180° F. The reason for this is that the fats generally used melt at a temperature lower than the gelatinizing temperature of starch, and some insulation of the starch granules may result. The solution is then brought to a boil, cooked for one to one and one-half hours, then pumped to a storage kettle where it is kept at a temperature of 190° to 206° by steam coils. It is desirable to keep the temperature as near the boiling point as possible but violent boiling should be avoided as it robs the size viscosity. The mixture remains in the storage kettles until called for by the size level control of the slasher size box. A temperature ranging from 204° to 206° is maintained in the size box by live steam coils.

Starch, the basic ingredient of sizing material, is composed of granules. These granules differ from those of other chemical substances, such as salt and

sugar, in that they are not uniform throughout. Each starch granule differs. The outer wall is more condensed than the inner wall and behaves differently.

Starch granules are built in layers, some of which are easily soluble while others are soluble with great difficulty. The outer layer, known as alpha amylose, is difficult to get in solution; the inner layer, known as beta amylose, is easily soluble. The beta amylose is soluble in cold water but the alpha amylose is not.

As the temperature of the size solution is raised to approximately 140° F., the hot water begins to soak into alpha amylose. As the temperature increases, the penetration of water through the alpha amylose and into the beta amylose also increases. As hot water soaks in, it dissolves the beta amylose and the granules to swell. The membrane of alpha amylose is very elastic and allows the granule to expand to many times its original size. As the quantity of water within the granule increases, it swells and finally bursts. The temperature at which the granule burst is known as the gelatinizing temperature and no two starches have exactly the same gelatinizing temperature. Temperatures for the common starches used in sizing are as follows:

Types of Starches	Gelatizing Temperatures
Potato	148°-155° F
Tapioca	160°-165° F
Sago	162°-165° F
Corn	167°-170° F
Rice	175°-182° F
Wheat	176°-180° F

During the swelling period, the viscosity of the mixture increases because of the increased size of the granule. As the granules begin to break, the viscosity decreases. Mechanical agitation also helps to break these swollen granules. The starch granules do not all break at the same time. Therefore, a cooked starch contains unbroken particles which continue their swelling and breaking under the influence of heat and agitation during use. The viscosity continues to drop. The usefulness of a starch paste depends in part on the amount of broken granules present. Because of their size, unbroken granules do not penetrate the yarn as well as do the broken granules.

Heat and agitation are continued until the desired viscosity is reached. Viscosity may be defined as the reluctance to flow. Viscosity is the reciprocal of fluidity, which is a measure of freeness of flow of the size mixture through pipes. This determines to a large degree whether the starch solution will penetrate the yarn or be merely pasted on the surface.

Temperature in the storage kettle is also accurately controlled by closed coils. The size mixture should be stored at temperature above 204° F., or as near the temperature of the size box as possible. The kettle is equipped with agitators to keep the mixture in constant agitation.

Size is applied to the sheet of yarn in a size box equipped with steam coils which have small holes to allow live steam to enter. The live steam keeps size solution at a temperature ranging from 204° to 210° F., and also thoroughly agitates the mixtures. Control of temperature is important because the rate of congealing of a starch paste on cooling will affect its properties in sizing. Any size which congeals too quickly will not penetrate sufficiently, resulting in excessive shedding in the weaving process.

After the yarn has passed through the size box, where it is sized and excess size is squeezed out by the squeeze rolls, it goes to the dry cans where the temperature is very closely controlled. If the yarn is baked by too much heat it will become brittle and tend to flake or shed off. This lost flexibility of a baked yarn can never be regained. A starch film which has been dried too much also has a disadvantage of very slow moisture pick-up in the weave room.

Warp yarn insufficiently dried will cause trouble in the weave room for if too much moisture is left a sticky warp will result. Mildew of yarn may also result from improperly dried warp yarn.

In order to assure accurately controlled conditions of sizing, mills have installed expensive automatic controls which controls time and temperature in cooking, storage, size box, and dry cans.

Temperature controls the making of the size mixture, the application of the mixture on the yarn, and the drying of the yarn. No other factor affects the sizing process more than temperature. The majority of defects caused in slashing may be traced, either directly or indirectly, to improper temperature control. The time and temperature of the cooking operation generally control the degree of gelatinization, which in turn governs the viscosity of the size. Size viscosity, in turn, influences the penetration of the size into the structure of the warp yarns during slashing. Only slight changes in heat application are necessary to bring about a change in size characteristics; therefore, the exacting control of the size temperature and the period of size cooking will influence greatly the degree of success with which the warp is sized.

Index to Advertisers

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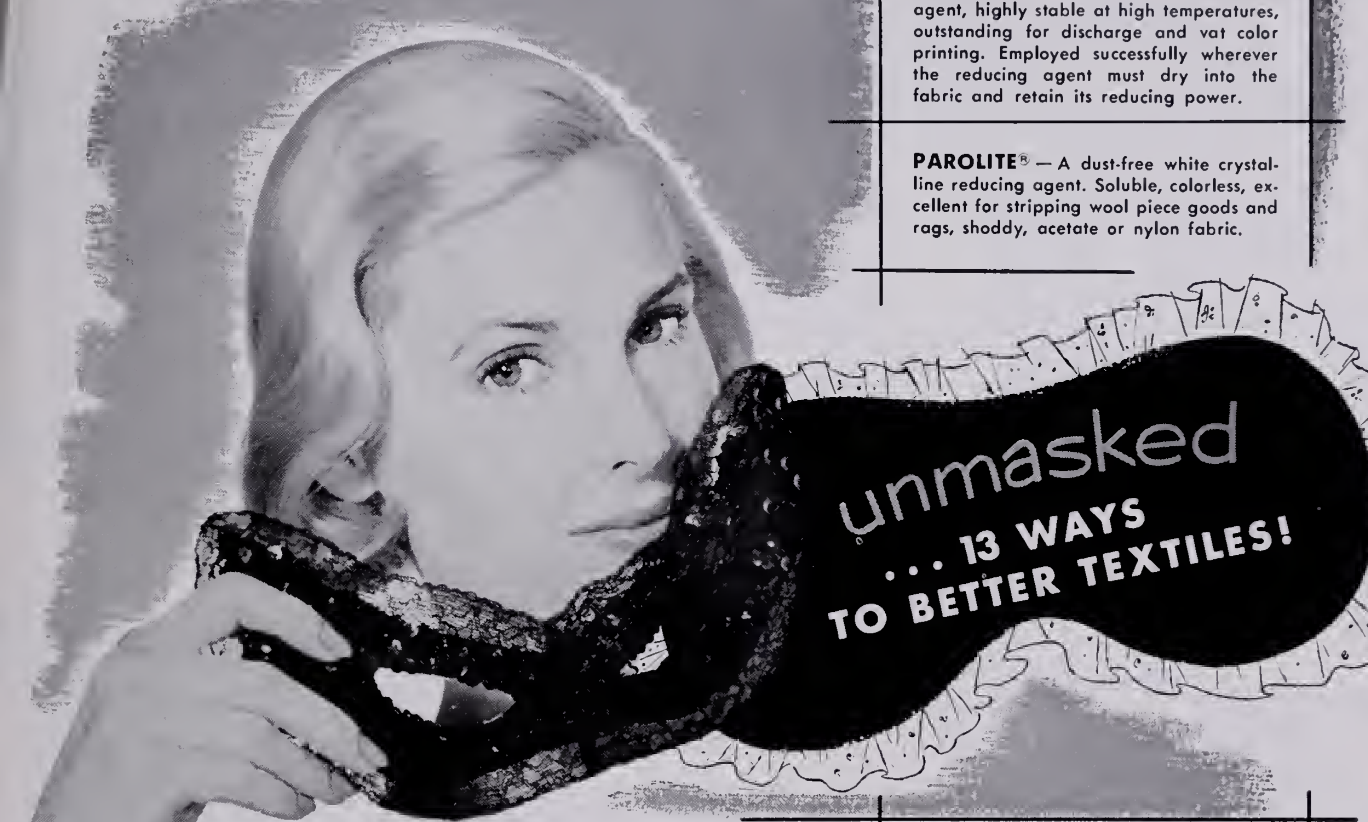

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THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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from the Editor

This issue is the last one prepared by the current staff. We hope our publications have been of interest and use to the industry. The new staff will be headed by Bob Wall, the present Managing Editor.

The article on Saco Lowell Research Center concludes our series on research in the textile industry.

The article on the Portable Uniformity Meter is the evaluation that one mill did on this relatively new testing machine.

Of special interest, we feel, is the topic "What Should You Do? Have You Considered a Textile Career?" This is a subject which we feel should be emphasized to high school graduates. Only the people associated with the textile industry can show young people what an opportunity there is for them in textiles.

The 1960-61 BOBBIN AND BEAKER staff seated from left to right: Robert Wall, Managing Editor; Tommy Arial, Editor; Harral Young, Business Manager. Standing, Lewis Kay, Circulation Manager; David Rodgers, Advertising Manager.

Evaluation and Possible Use Of Portable Uniformity Meter

In this article the data obtained using the Portable Uniformity Meter will be compared with that obtained using the Uniformity Analyzer. The amount of data obtained is, of course, too great to include all of it. The highlights in each process will be discussed with findings and conclusions. A list of advantages and disadvantages of the Portable Uniformity Meter compared to the Uniformity Analyzer will be given for each process.

The procedures used in making Portable Uniformity Meter measurements are those recommended by the Lee Sona Corp., unless otherwise stated. The % NU determinations are by regular laboratory methods unless otherwise stated. For simplicity, the Portable Uniformity Meter will be termed "PUM" with Uniformity Index (U. I.) being the measured quantity. The Uniformity Analyzer (Laboratory Model) is termed "U. A" and its measurer quantity is "N. U."

Of all processes tested, the PUM was used to greater advantage on Carding than any other.

Statistical calculation of U.I. data in two locations yielded the following summary results in Carding:

	#1 Location	#2 Location
No. of weeks in calculations	4	5
Total No. of determinations	440	485
Average U. I.	100.33	95.86
Standard deviation	7.22	4.55
Control Limit:		
95% Significance Level	107.32	104.96
99% Significance Level	114.31	109.51

From these data plus individual data by card, the following conclusion may be drawn:

1. There are only a relatively small number of cards in either location which have a high U. I. These, in general, are the cards which can be ascertained to have higher than normal % NU.

2. Cards which have U.I. in excess of the 95% significance Level Control Limit have deficiencies which were ascertained.

3. The machine variation in Location #2 is considerably less than in Location #1. This indicates that the cards in Location #2 operate more on an even level than those of Location #1. The closer Control Limits in Location #2 are the result of the smaller variability.

4. There is a significant lower U.I. of the Metallic Cards when compared to the Fillet Cards in Location #2. The average U.I. for Metallic Cards was 82.1 compared to to the room overall average of 95.8. It was also observed that no Metallic Card had a U.I. of over 90 during the entire test, while no Fillet Card had a U.I. of less than 90. From previous % NU data this was believed to be true, but had never been tested statistically. This difference in U. I. is certainly significant and real.

5. In general, the Cards that are high one week remain high the following weeks some repair or adjustment is made to improve the U.I.

6. For ease of determining periodicities in Carding the PUM Chart is by far superior to the U.A. Chart. With the PUM Chart it was possible to find doffer periods which were very small in magnitude. Any other method of finding these small magnitude periodicities would have been unsatisfactory.

Various typical cards defects found include:

1. Doffer periodicities.
2. Low teeth on doffer gear.
3. Defective teeth in intermediate gears between the doffer and the calender rolls.
4. Low places all the way across the doffer caused by grinding rolls.
5. "Chattering" gears between doffer and calender roll.
6. Eccentric Feed Roll.
7. Bad selvages, tags, etc.
8. Low teeth in feed roll gear.

The advantages of the PUM in Carding uniformity tests are:

1. Very rapid.
2. Longer samples run without destroying sliver.
3. U.I. is simpler to obtain than % NU.
4. Periodicities and other defects show much more pronounced than with the U.A.
5. High U.I. is an indication of high nonuniformity.
6. Modifications of sensitivity and other settings may be made to affect the chart and not the U.I. Since % NU is always calculated from the chart, additional samples must be made if increased sensitivity is used.
7. The instrument is stable and drift is insignificant.

The disadvantages of the PUM in Carding are:

1. No coiler head deficiencies can be determined because sliver is tested before it reaches the coiler head.
2. Small differences in the nonuniformity cannot be detected with PUM.
3. U.I. does not consider the variation about the average weight produced by each card at any time. Instead it gives a variation about an average weight that we select. In % N.U. work, each sliver is adjusted for its own average weight.
4. Variations in delivery speed and weight of sliver from card to card introduce error in U.I.

A summary of U.I. measurements for Finisher Drawing at Location #1 and Finisher and Breaker Drawing at Location #2 is shown in the following table:

	Location #1 Finisher Drawing	Location #2 Finisher Drawing	Location #2 Breaker Drawing
Total No. of determinations in calculations	155	207	157
Average U.I.	98.39	98.46	101.38
Control Limit:			
95% Significance Level	106.17	106.62	113.02
99% Significance Level	110.06	110.70	118.84

The control limit shows when a measurement becomes higher than normal. It is expected, at the 95% Significance Level Control Limit, that a deficiency or some other than normal condition exists at that particular delivery. Average U.I. from location to location cannot be compared because the weight of sliver, settings, of PUM, etc. are different.

The PUM's advantages in Drawing tests are:

1. In addition to the advantages found in Carding, the length of sample for a one-minute determination with the PUM is about 150 ft. as compared to the 25 ft. sample used with the U.A. This additional testing length is very much desired.

2. All finisher drawing deliveries can be checked in 2 to 2½ hours.

3. Very long term variation can be found if it exists using this relatively longer sample.

The disadvantages of the PUM in Drawing are:

1. No coiler head defects can be observed because sliver is tested before it reaches the trumpet.

2. Sliver weight variation from delivery to delivery is not to be considered by PUM.

3. Magnet on the sliver head is not sufficiently strong to hold the head in place. The operator must manually hold the bridge box and head while making the measurement.

There are two methods of making measurements in the Roving process. First, one minute determinations may be made to obtain a U.I. reading. Second, a short section of Chart, about 10 seconds in duration, at each spindle location can be made and a comparison of these charts can be made to determine differences between spindle locations.

In Location #1, we found very little or no difference in the uniformity produced by the FS-2 frames either frame to frame or spindle to spindle. The FS-2 frames in Location #2 appeared to be similar to those experienced in Location #1. However, the Whitin frames, which produced the filling roving, appeared to be radically different from any of the FS-2 frames. Some of this difference is due to the finer hank roving (1.50).

We were able to determine, by U.I. and Chart readings, bad rolls which we inserted. In some cases we were able to determine some bad top rolls. For ex-

(Continued on page 15)

Phi Psi Iota Chapter News

Since the Fall Issue of "Bobbin and Beaker," Iota Chapter has made a field trip to Deering-Milliken Research Center in Spartanburg and Lyman Printing and Finishing Company in Lyman. While at the Research Center, the members were given an extensive tour of the building and its facilities. Very capable guides explained the various operations and answered all questions. After a very delightful meal was served in the dining room, the group then traveled to Lyman and enjoyed a most interesting tour of their printing and finishing operations. Faculty advisor David Gentry and Dr. Martin Chanin accompanied the group on these visits.

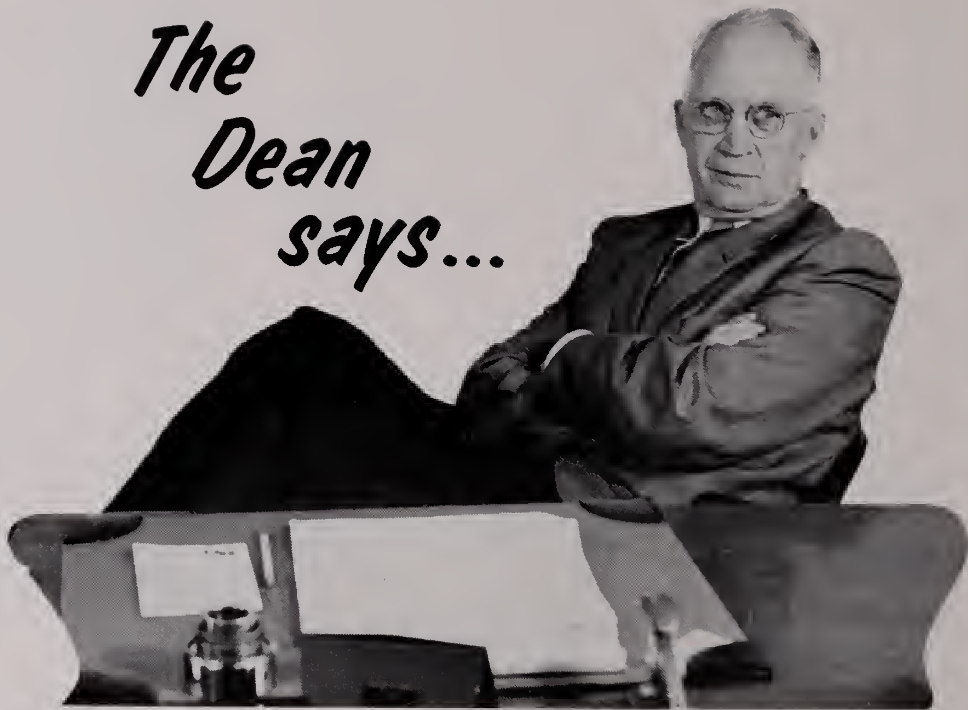
Iota Chapter, along with the NTMS and AATCC Chapters of the textile school, were entertained with a steak supper at Dan's by Judson Mills and Gerrish-Milliken Mill on March 8. The supper was attended by prominent men from both of these Deering-Milliken Mills and members of the textile school staff and department heads.

Members of Iota Chapter assisted in registration and tours for the ASME—Textile Engineering Conference held March 15, 16, and 17 at the Clemson House.

Iota Chapter will have a softball team in the Spring Intramurals for the first time in years. It is hoped that this will create new interest in Phi Psi and will eventually develop into a very active participation in Intramurals by our Fraternity.

Members of Iota Chapter are looking forward to the Annual Phi Psi Convention in Washington, D. C. This convention offers an excellent opportunity for the student delegates to meet and talk with some of the top men in the textile industry as well as having a great deal of fun and fellowship.

The Dean says...



The enrollment prospects for next year are looking up. The latest figures from the registrar's office show that of next year's entering freshmen 83 have signified a preference for one of the Textile Courses. This compares with 56 for the same time last year. The Clemson Liaison Committee is doing a wonderful job on selling a Textile career to the high school students, parents, and teachers. Betts Wilson is now visiting the committee members, giving what help he can.

In our curriculum revision of four years ago, we included a seminar course. The idea was to have men from the industry come in and speak to this class on a wide range of subjects. Besides the students taking the course, all other students and factulty members are invited to attend. We have tried to cover those fields that are least touched on in formal classes.

We have covered the field from cotton procurement to cloth selling. Included were speakers on personnel work, industrial relations, waste control, and many other subjects. we are tremendously pleased with the program.

Our research department continues to grow. Our last move is to air condition a laboratory to do combing research. We now have a contract to do some work on combing and we expect to increase this.

We are spending several thousand dollars bringing our slasher up-to-date. This includes a larger size kettle and the latest thing in controls. We are doing a great deal of work in the field of slashing research, both on cotton and man-made fibers.

We are in the process of starting up four new looms for doing a weaving evaluation study on the yarn spun in the pilot plant.

Come by to see us.

Outstanding Seniors . . .

By
William E. Barrineau, Jr.

DAVID A. WALLACE

A three-year basketball letterman, David A. Wallace is honored as an outstanding senior. David, age 22, is a Textile Management major from Spartanburg, South Carolina. David, a day student, is married and has two fine children.

David, who is on a full basketball scholarship, has kept up with his studies closely, for his name, too, has appeared on the Dean's List of Honored Students on several occasions.

David is a member of the PHI PSI and the Phi Kappa Delta. He is also a member of the Block "C" Club.

Age 22, John B. Swart came to Clemson from Venezuela in order that he might major in Textile Management. John, a foreign student of Dutch nationality, lived in Buenos Aires, Argentina, for 4 years prior to moving to Caracas, Venzuela. One year later he came to Clemson. Practically every semester, John's name has appeared on the Dean's List of Honored Students.

John is now Vice President of the International Students Association, and Junior Warden for

JOHN B. SWART

PHI PSI. He served, at one time, on the Freshman YMCA Council.

John has worked in Buenos Aires, Argentina, and at "Tocome" Industria Textile S. A. in Caracas, Venezuela. The following year John worked at Newberry Mills, Inc., in Newberry, South Carolina.

Bill Townsend, a Textile Chemistry major, is a married student. He has one child. Bill, age 22, is resident of Aiken, S. C.

Every semester of Bill's attendance at Clemson, his name has appeared on the Dean's List of Honored Students. Bill is a member of many campus organizations. His memberships include the PHI PSI, Block 'C' Club, Golf Team, AATCC, and Phi Kappa Phi. He has also served in the Air Force ROTC.

In the textile field, Bill has gained valuable experience with the Graniteville Company in Graniteville, S. C., having worked with this company for two summers.

FRANCIS A. TOWNSEND (Bill)

Saco-Lowell Research Center

By
Forrest Dixon

(Information furnished by Saco-Lowell)

The Saco-Lowell Research and Development Center has been charged with the important responsibility of designing and developing more efficient and more economical yarn preparatory machinery. Designed specifically for the research and development of textile machinery, this single story building of yellow faced brick contains forty thousand square feet, and situated on the top of a knoll occupying nearly thirty acres of the new Ravenel Research area overlooking the Clemson College campus. Air-conditioned and humidity controlled throughout, the building provides special prototype rooms, model shops, and a variety of laboratories which provide ideal conditions in which both research and development activities can be carried out.

While modern facilities are essential for effective research and development, the experience of the people who staff such a facility is even more important. The Saco-Lowell research and Development Center is staffed by an outstanding group of engineers and technicians headed by Robert M. Jones, Saco-Lowell Vice President and Director of the Research Center, and a forty year veteran of the company with many firsts and patents to his credit. Jones' staff, under the direction of Gordon C. Anderson, Harry J. Burnham, and Erhard E. Stiepel, combines the proven experience in the textile machinery industry with the fresh viewpoint provided by skilled engineers and technicians from other fields.

The Research and Development Center is divided into four departments—Research, Development, Test, and Administrative. The Research Department is responsible for the investigation of new ideas and to explore their feasibility when put into effect. The staff of this department takes into consideration all the ideas and theories which they gather from their own experience and from the ideas submitted by Saco-Lowell's representatives throughout the world. One main source of ideas for machine improvements comes from the textile industry where the need for more efficient and more economical operating machinery is a constant problem for competition in the industry. These ideas are transferred onto paper in the form of rough sketches and often small working models are constructed for the benefit of Saco-Lowell's engineers. A scientific appraisal of machines now in production is made and when possible machines in existence are incorporated into a new or 'beefed-up' machine to do the job. If the goal to be achieved requires a totally new concept, the drawings and notes are submitted to the Development Department. The main objective of the Research Department is to blaze new frontiers to assure the continuous improvement of the textile arts.

The Development Department, as the name implies, must, often starting from scratch, develop a new machine to do a job. If a totally new concept must be employed, the Development staff experiments with many ideas before the correct design for the part or the entire machine is found. Such was the case in the development of the Rovematic roving frame. When the need for a roving frame capable of turning out more roving at a lower cost was brought to the attention of top men at Saco-Lowell, they thoroughly investigated all aspects of the situation and concluded that a completely new concept of roving frame construction would be needed if production rates were to continue to rise on a sound basis. Reworking the old design any further was rejected as being impractical. Forcing more speed under heavier mediate saving, would soon be paid for through the accelerated machine wear and breakdown which would naturally ensue. The development of a new machine requires three to five years of intensive ef-

fort because of the many concepts and ideas which must be tried before the most practical design is discovered. When the Development staff has completed a satisfactory working model the project is returned to the Testing Department into full size prototypes which are tested by the Testing Department.

The Testing Department submits the experimental parts from the Development Department to a most rigorous set of trials. The design is checked for its efficiency under ordinary mill conditions and then it is purposely abused to check its workmanship and endurance. The Testing Department compares the results of each test with those of a machine now in production and also with the standards set up by the other departments in the Research Center. If a part falls short on any one item, it is sent back to the Development Department, where it is revised or discarded in favor of a better or simpler design.

Throughout the Research Center importance is placed upon simplicity of design and ease of maintenance. A machine must be easily and economically made; however, this economy must not hinder the quality of the finished product. A properly constructed machine must also be easily repaired and cleaned. The design must be such that a replacement part can be installed or the machine itself overhauled when the need arises. One of the features of many Saco-Lowell developments is self-lubrication and to some extent self-cleaning. The Rovematic roving frame features a self-contained lubrication system which requires no servicing other than periodic inspection of the oil level. The self-lubrication and self-cleaning features alone clearly cut down on the maintenance of parts and extends the working of the machine.

Most developments coming out of Saco-Lowel's research take from three to five years from their first inception until they are in mass production and available to the textile machinery market. One of Saco-Lowell's recent developments is the model SJ Spinning Frame, a major stride forward in attaining higher production rates. To gain higher production the efforts of Saco-Lowell engineers were directed to the ring and the traveler, for many years the barriers against increased speed. The Saco-Lowell frame of 1952 proved that the old 'mile-a-minute' traveler speed concept was a myth and that by proper balloon control, it could be safely exceeded. Today, the new

Marathon Ring, coupled with proven balloon control, permits Spindle speeds unheard of for large packages just a few years ago.

However important speed is, it is of no benefit to the mills without constant maintenance of yarn quality. This is one of the great attributes of the Magne-Draft Pressure System. Using the forces of magnetic attraction to produce required roll pressures, Magne-Draft does away with conventional weighing apparatus and eliminates all lubrication (oil and grease) in the drafting zone. Magne-Draft is now proving in leading mills that it gives the cleanest, most efficient operation of any spinning drafting element ever developed. Because the magnetic forces are constant and not subject to the variables of mechanical weighing systems. Magne-Draft delivers a more uniform yarn.

The Magne-Draft concept was one of the major break-throughs in the improvement of spinning frames brought about by Saco-Lowell Research. The Magne-Draft concept was first worked on in 1946 and a patent was issued in 1954. This revolutionary idea was patented after only eight years of research and it is the first major change in design of drafting rolls on spinning frames in the history of that machine. The first full scale prototype was exhibited at the Textile Exposition in Greenville, South Carolina in 1958 and mass production was begun in 1959.

The Magne-Draft concept is a good example of the type of research carried on by Saco-Lowell. They are constantly striving to improve their machines and thus increase production and thereby cut operating costs in the mill. Research is the only way we can improve the textile industry. It is only through research that the future of the American Textile Industry can be assured.

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An Evaluation and Possible Use Of A Portable Uniformity Meter

(Continued from page 8)

ample one spindle had a U.I. of 150 and % NU of 43.3%. Replacement of the top roll cleared this condition.

The advantages of the PUM in Roving are:

1. Relatively fast. Can measure one frame for U.I. on every spindle in about 3 hours. With the short method, all spindles may be checked in about one hour per frame.

2. Can spot check about 12 spindles to characterize a whole frame.

The PUM's disadvantage in Roving are:

1. Shorter sample used. A one-minute determination will give about 35 feet of roving tested.

2. Some trouble with ends down.

3. Must be particular to get all roving twist out before making measurements.

In the Spinning process the PUM was used to check spindle to spindle, side to side, and frame differences. A summary of data for both sides of one warp frame appears below:

	Right Side	Left Side
Average U.I.	96.3	95.3
Standard Deviation	2.01	1.96
C. V.	2.09%	2.0%
Highest Value Obtained	118	130

From this summary of data, it can be seen that some spindles throughout the side or frame have poor uniformity as compared to the frame average. The 130 U.I. spindle was due to a bad top roll, while no deficiency could be found at the 118 U.I. spindle it to have a U.I. of 100, so presumably the 118 U.I. was due to some roving differences.

From this procedure, it was possible to determine some spindles which were producing poor quality work. Among these were bad front top rools, condenser missing and a bad apron. However, most of these defects can be noted by careful inspection of the frame. Since it takes about 8 hours to measure

one frame of spinning, it is impractical to consider measuring every spindle location. Careful inspection of spindle locations on one frame could be made probably in one half-hour.

The most realistic approach to spinning is to try to characterize a side by a small number of spindles in order to find high and low sides in terms of U.I. To do this, 12 spindles should be measured on each side in order to obtain a reliable result. This is based on a C.V. of approximately 7%, 5% sampling risk, and 1.4% error.

From data it has been determined that a side average must be higher than the average for the whole group of frames to be significant at the 99% level.

The advantages of the PUM in Spinning are:

1. It will pick out defects. However, most of these defects are apparent to the eye.
2. May be advantageous to determine sides which are producing high nonuniformities if used on a routine test basis.

The disadvantages of the PUM when applied to the Spinning process are:

1. Excessive ends down on filling.
2. Length of time required makes it impractical to determine the U.I. of every spindle.
3. Only short samples are used.
4. Small amounts of trash in the yarn causes extreme deflections of the meter. This, coupled with the low response of the meter, makes it extremely easy to obtain large erroneous readings.
5. Excessive drift occurs unless the machine is allowed to warm up for a period of two to three hours in the atmosphere of the room where the measurements are to be made.
6. Determination of U.I. in spinning is very fatiguing to the operator.

There are several general conclusions which can be drawn from these tests. The experience with the PUM has shown that it is a very good instrument to be used in carding. Also, drawing and roving can be measured effectively with this machine. However, its use in spinning does not seem to be advisable. Both machines have their own errors and bad features. In general, they agree quite well over a large range of uniformity, but small differences cannot be detected accurately. As long as both are consistent in their results, they will both be of value.

WHAT SHOULD YOU DO?

Have You Considered A Textile Career?

W. Harral Young, Jr., T.M. '61

When a boy graduates from High School it is seldom that he really knows what he wants in the way of a career. In this day of electronics and science a young man is easily confused with much of the "glamour" talk that is constantly being spread. Very often this same young man chooses one of the so-called glamour careers only to find that he is not satisfied with it. The time to make this all-important decision is before you choose a career for which you are not suited. Make this decision wisely for, chances are, this will be your life's work.

This school year there is a definite trend upward in the starting salaries being made by many textile companies which have interviewed at Clemson. The average offer is well over $400 per month with several offers exceeding the $500 per month mark.

Practically every textile student who will graduate this year has had several job offers. There are openings in sales, research, production, personnel, engineering, management and many other related fields. There seems to be an increase in the competition among the textile firms for the textile department graduates due to the ratio of graduates to the number of jobs open. Even if all the textile graduates do enter the textile industry many other openings will have to be filled from industrial management and engineering departments due to the large number of jobs available.

Many of the companies are also adding attractions to induce the better students to come to work for them. Several have added retirement programs for the management while others have added incentive and bonus plans for beginning executives.

Training programs of various forms are also being set up by many of the textile concerns. This has especially proved effective in securing the young graduates who are interested in the production fields. Many of the companies are also sending employees back to Clemson during the summer months to attend the short courses offered in the various textile fields.

The companies' interviewers look for different qualities in the graduates as they talk with them and inspect their records, but all seem to favor the student who has had some experience in textiles even if on a very limited level. A student with an outstanding extra-curricular activity record usually is an outstanding leader in industry. Of course grades play an important part in the selection of the graduates.

During the next few years there will be even more job opportunities for college graduates in the field of textiles and competition is expected to increase even more among the companies looking for management trainees.

Many of the large companies and larger chains of mills are even hiring graduates with military obligations. They hope that by working the young men the short time before they must enter the military service they will be able to rehire them after the military obligation is completed.

Are you still interested? Here are a few pertinent facts about the Clemson College School of Textiles. Clemson offers three major courses which lead to a Bacelor of Science degree. They are:

1. Textile Management—This is the area where textile specialist pool their knowledge and ideas and come up with the "woven wonders" that the public enjoys today. Surveys prove that qualified men get top managerial jobs faster in textiles than in any other industry. These same surveys also show that they stay there longer and make more money than in other industries.
2. Textile Chemistry—This graduate is primarily engaged in dyeing, bleaching, and finishing of the goods. Here, an otherwise poor looking fabric can be made to look attractive. These men were also instrumental in the development of wrinkle resistant, drip-dry and a host of other finishes. There is also a place for the Chemist in the synthetic fiber industry.
3. Textile Science—Although many of the textile manufacturing processes have remained basically unchanged through the years, the machines used to accomplish them have not. The Textile Scientist is primarily interested in the machines, how they operate, how they can be improved, and how certain operations can be eliminated or combined with others. Many graduates in this curriculum continue their education through graduate school and then on into research.

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Student Publication School of Textiles
Clemson A & M College
CLEMSON, SOUTH CAROLINA

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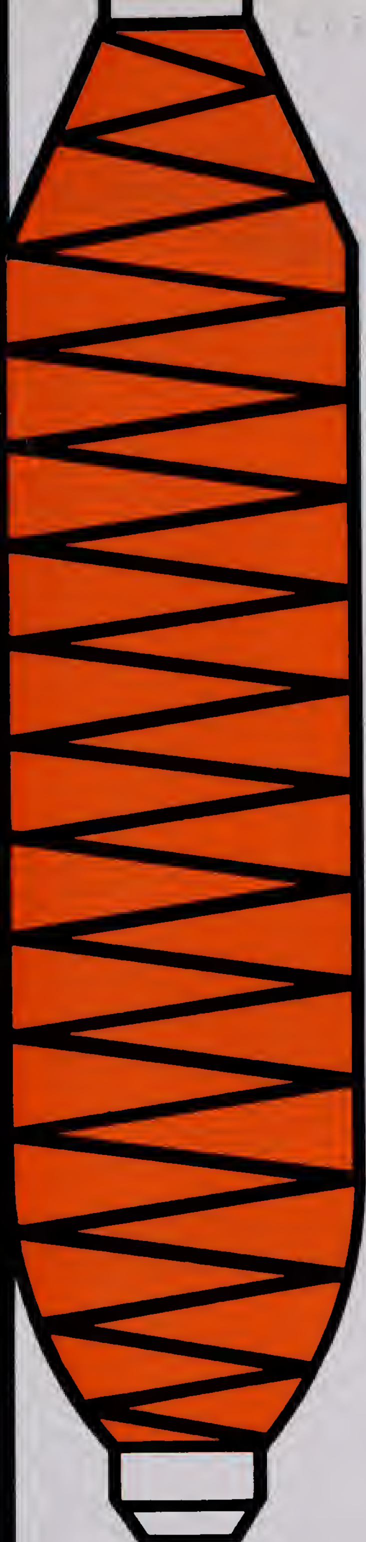

Bobbin & Beaker

CLEMSON COLLEGE

SUMMER ISSUE 1961

THE

Bobbin & Beaker

Official Student Publication
Clemson Textile School

VOL. 18 SUMMER ISSUE 1961 NO. 4

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THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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from the Editor . .

To the faithful reader of this magazine, several changes may be apparent to him. The new 1961-62 staff hopes that these changes are for the best. At this time the staff wishes to extend to each and every reader an invitation to submit suggestions on any particular phase of our publication. We are at all times open for suggestions, concerning the type of material you want to read. This is **your** magazine, and the staff wants to make it as enjoyable and educational as possible. Let us know what you like!

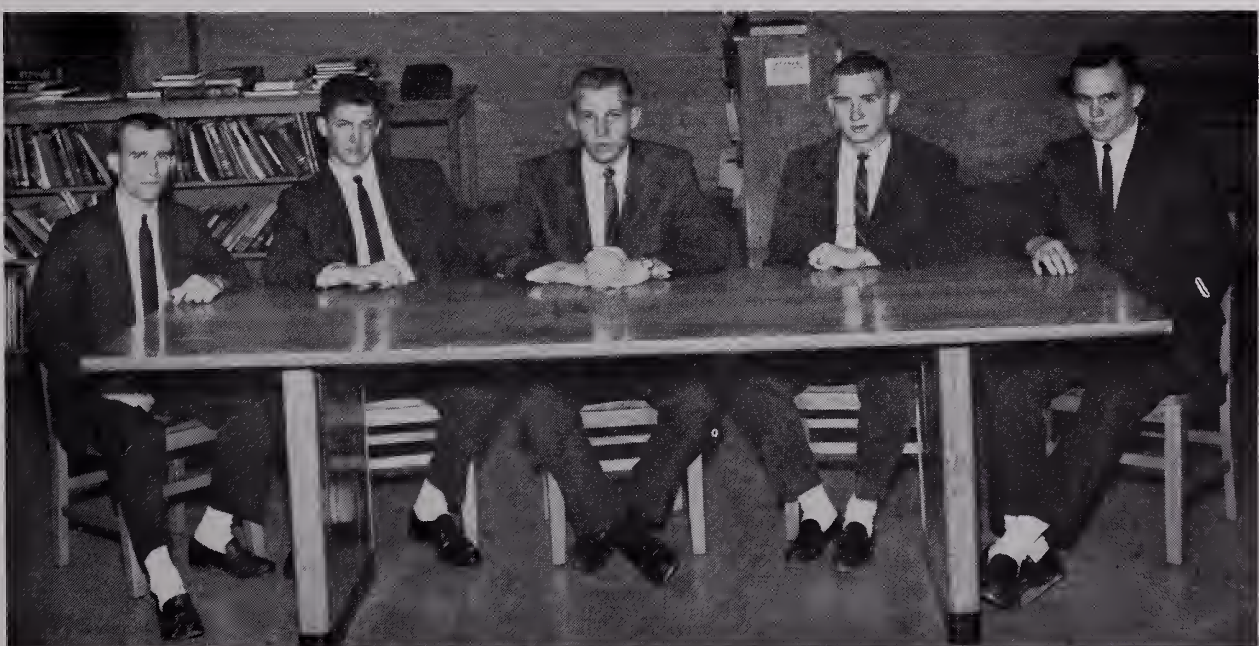
One of the several different types of articles is a short explanation on the basic fundamentals of paper machine felts. It is felt by the staff that many of our readers certainly realize the importance of paper but are not fully acquainted with the product of the felt that makes paper possible. This article is the first in a series, in which later issues will carry a more detailed outline of a specific type of paper machine felt.

Again, a new type of article appears in the form of a report by Senator Olin D. Johnston. Here, the Senator gives his views on the foreign trade problem and the effect the new administration will have on the textile industry. At this point, may I quote part of our policy: "The views and opinions expressed in all guest articles are those of the writers themselves, and must not be construed to necessarily represent the views and opinions of the Editors of this magazine or of the Faculty of the Clemson College School of Textiles."

From requests of many Clemson Alumni, a new column has been started. We hope "Alumni News" will also interest others besides Clemson graduates. The staff now wishes to extend a plea to all Clemson Textile graduates to please send in their name and address to us so we can continue this column. I'm sure you realize the almost impossible task of contacting our graduates of years gone by. Your friends and fellow classmates want to know about you!

Of interest in the textile chemistry field is Dr. Goldemberg's article. We feel that there are several ideas presented that have a slightly different slant.

The staff wishes to extend a hearty "Thanks" to all of our writers for our Summer Issue. We hope that our readers have gained both enjoyment and information from our first publication. —R. E. W



The 1961-62 Bobbin and Beaker staff seated from left to right: Crawford Love, Circulation Manager; Barry Barrineau, Managing Editor; Robert Wall, Editor; Charlie Hagood, Advertising Manager; Norman Guthrie, Business Manager.

Our Mutual Problem

By
Senator Olin D. Johnston (D. S. C.)

Olin D. Johnston, now serving in his third term as U. S. Senator from S. C., has served in various public offices since 1922. After serving in World War I, he went to school at Wofford and later to law school at the University of S. C. He served for several years in the State House of Representatives. In 1934 he was elected Governor of South Carolina. In 1944 Senator Johnston was elected to serve in the United States Senate. He served again in 1950 and 1956. He is now the 14th ranking Senator. At present he is Chairman of Committee on Post Office and Civil Service, member of Agriculture Committee, Ex-Officio member of Senate Appropriations Committee, and member of both the Judiciary and Steering Committee of the Senate.

In 1960 imports of cotton yarn jumped to 14 million pounds from less than on million pounds in 1958. Imports of cotton cloth tripled, synthetic fiber fabric imports doubled, and apparel imports are up 70%. During the last 10 years over 400,000 jobs have been lost in the textile industry. In North and South Carolina alone 74 mills have been forced to close their doors.

The textile industry is in dire straits, and I appreciate this opportunity to express my views on our textile problems and their solution to a magazine whose subscribers have sufficient background to understand our dilemma. As for myself, I first started work in the textile industry as a sweeper in 1907. I subsequently worked in both the spinning room and the weaving shop of cotton mills for 10 years.

One of the first pieces of legislation I introduced and saw passed as a young State legislator was a bill to improve sanitary conditions in the mill villages. Since this early date I have done everything in my power to help the textile industry and the workers that derive their livelihood from the industry. During the second World War, the textile industry, like most others, thrived. However, shortly after the war ended, there was a concerted effort, principally by our State Department, to appropriate hundreds of millions of dollars to rebuild the Japanese textile industry. Along with this went rights to U. S.-improved machinery and techniques. I opposed this action from its inception and warned that we would be using American money to build Japanese industries to compete with our own. With their cheap labor they obviously could cut into our world markets.

Not only were my warnings unheeded but the various agencies of our Government made large cash grants and gave sanctions to other countries to build up textile industries in direct competition with our own. In the matter of protecting our domestic market from these foreign competitors, our State Department again prevailed and adequate protection was denied to our industry. Consequently not only did these competing countries capture a large percentage of our foreign sales but they cut severely into our domestic market.

The trend should have been evident to anyone who could see, but in the early years I was virtually a lone voice in the wilderness. During that 10-year period when I sought assistance for the textile industry, many voices were quieted by State Department assertions that we had to have trade with Japan, to rebuild her economy, and we must import so that we could in turn export to other countries.

I have never been against trade with foreign countries. I have merely been against completely dropping all trade protection. Such action encourages foreign countries to flood our markets with low-priced goods made with cheap labor working under conditions that would be illegal in this country. I know we have to trade with others, but we don't have to allow them free access to **our markets** to such an extent that our industry will be wiped out.

It was pointed out to the Senate subcommitte studying this problem that if the figures illustrating the decline of the textile industry from 1948 to date are projected ahead, the industry will be completely finished in less than five years. I repeat, according to these figures, if they are projected ahead, there will not be one yard of cotton, manmade fiber, or woolen cloth produced in this country five years from now.

Bear in mind, please, that I am speaking of the end of an industry that has been declared second only to steel in importance as a defense industry by the Department of Defense. Bear in mind also that I am speaking of an industry that hires almost 1,000,000 workers and directly affects the garment industry, which employs over 1,000,000 additional workers. We have in these two industries alone 2,200,000 potentially unemployed if we allow present trends to continue. This does not take into account wool and cotton producers, etc., who have a direct stake in the continuance of a strong, vigorous textile industry.

I would further like to point out that this is not a problem local to the South only or to New England. There are some 8,000 textile plants scattered through

44 states across this great land of ours. Happily, their representatives in Congress are beginning to raise their voices against the continued decimation of America's oldest industry. Fortunately, we are beginning to pick up allies in our struggle for fair play.

Gloomy as the present situation is, though, I have reason to hope for a brighter future. Before I go into what we need in the way of relief for the industry and our possibilities for getting it, I wish to make one point just as clear as possible. The textile industry is not asking for government intervention or subsidies. All it asks is that we insist other countries observe substantially the same rules of conduct that are required of our own industry. Since the government to a large extent sets up the "ground rules," the government should apply them alike to all.

Our domestic producers must pay six cents a pound more for cotton than the amount paid for the same cotton by the foreign competition. This amounts to over $30 a bale subsidy to foreign competitors by **our own government.** This, of course, represents the difference between the domestic price of cotton and the world price. Since cotton cost equals approximately 50% of the total cost of the finished textile product, it is readily apparent that our producers are operating at a big cost disadvantage.

In addition, the average textile worker in the United States makes approximately $1.71 an hour. In comparison Japanese workers get around 25¢ an hour, and those working for our competition in Great Britain average only around 54¢ an hour. We cannot afford to permit continued importation of products made by slave labor which will certainly put our own mills out of business and cast our textile employees out of work. To glibly suggest that our textile industry should be able to overcome this great disadvantage by plant modernization and superior techniques which, at best, constitute only 20% of the cost of textile production is patently ridiculous and certainly is a callous attitude towards our working people. There is the added disadvantage that any modernization undertaken by us could be duplicated by foreign corporations at half the cost to American mills.

Our textile industry has been doing an excellent job at holding down prices. The price of textiles at the mill level is less than it was during the 1947-1949 period, while other industrial prices have gone up on an average of about 25%. It should be obvious to even the casual observer that the combined forces of cheap cotton and cheap labor are just too much for the American industry to combat.

Even when this realization has dawned on various government agencies in the past, however, no relief has been granted. The usual argument against granting relief, as I have pointed out, is that foreign relations considerations override the domestic diffi-

(Continued on page 12)

PAPER MACHINE FELTS

By
David D. Sanderson

Paper making in the United States began in 1728, but the early textile felt makers were unable to produce an endless felt to convey the paper through its manufacturing processes that would equal the quality of European felts. So, for many years most felts were imported from Europe.

Albany Felt Company, the youngest of American paper machine felt manufacturers, was established in 1895. Today, after 66 years of operation, Albany Felt is known as the World's Largest Manufacturer of Paper Machine Felts and Industrial Fabrics with six plants employing about 1700 persons. These plants are located in Albany, New York; St. Stephen, South Carolina; North Monmouth, Maine; Hoosick Falls, New York; Cowansville, Quebec, Canada; and Cuautitlan, Mexico.

While Albany Felt was established to make paper machine felts, operations were gradually expanded to include the manufacture of a diversified line of woven industrial fabrics including sanforizing blankets, slasher cloth, slasher jackets, card clothing foundation cloth, lapping cloth, filter cloth, dust bags and other special fabrics made for the tanning industry, printing and lithographing operations and sporting goods manufacturers.

The St. Stephen plant completed in 1956 was the first in the South to perform all operations in the manufacture of paper machine felts. The shipping of the first papermaker's felt to be completely manufactured in the South coincided with the official dedication ceremonies on May 12, 1956. The plant, constructed and equipped at an estimated total cost of $2,500,000, is located on a 117 acre site on the outskirts of St. Stephen, between Lake Moultrie and the Santee River, 45 miles from Charleston. Plans have been announced recently to construct an additional 33,000 square feet to the present plant.

A papermaker's felt is a wide woven fabric usually made of wool and finished into the form of an endless belt used on the papermaking machine to carry the pulp or newly formed sheet of paper or paper board. The felt traveling on the machine at speeds up to 1200 feet per minute must be porous enough to drain excess water, strong enough to drive the machine

Mr. Sanderson is Plant Industrial Engineer of the Albany Felt Company's St. Stephen, South Carolina plant. He is a native of Birmingham, Alabama, and graduated from Auburn University in Industrial Management. A member of the American Institute of Industrial Engineers, Mr. Sanderson also, has been employed by the American Enka Corporation and the American Bosch Corporation prior to joining the Albany Felt Company in 1957.

rolls and of suitable texture to impart the desired finish to the paper. Felts for some types of modern machines may measure 340 inches or more in width and some, used in the manufacture of paper board, are made in lengths nearly 300 feet long.

A paper machine felt is produced initially much the same as most woolen fabrics. The yarn making processes consist of scouring, blending, carding and spinning. Carding equipment consists of two 84 inch Davis and Furber cards and several Model F, Davis and Furber Spinning Frames. More than 500 different yarns are made with this equipment which necessitates a considerably smaller average batch size than the normal textile operations. Throughout the yarn making process yarn weights, twist and other characteristics are carefully controlled to provide the most consistent yarn possible from the woolen raw material. While the basic raw material is wool, occasionally synthetics are blended with wool to provide maximum felt life and maximum paper production during the felt life on the paper machine.

The weaving operation, if the felt is very fine and closely woven, may require as much as 144 hours of weaving. To keep the flow of some 3000 styles and sizes of felts constantly moving through production, looms range in size up to 650 inches in width. Looms exceeding 92 inches are rare in an ordinary woolen mill but necessary for uniform weaving of large felts to clothe the larger paper machines in operation today.

In a delicate process, felts that are too long or too fine to be woven endless (some felts can actually be woven tubular or endless in the loom) are joined by hand. Joining of some felts takes 32 to 48 hours. This is so skillfully done that only an expert can detect

and difference from a felt that was originally woven endless.

The felt is "fulled" (thickened and compacted) to size in a rotary fulling machine. Mechanical pressures on the wool, with soap and water as a lubricant, cause an interlocking of the fibers which is called "felting" or fulling. The damp felt passes through an adjustable "throat" and between heavily weighted rolls. At regular intervals, the operator checks the length of the felt while it is still in the rotary machine and records the figures for comparison with the fulling records of previous felts of similar specifications.

After being washed under controlled conditions, the felt is napped and dryed on steam heated dryers with the felt stretched out between huge steel rolls under exacting tension. Also at this point, the length and width are checked again to make certain that the felt will run correctly and exactly for the customer for which it was assigned and engineered.

Each area of every felt on both sides is inspected for any defect and should any be found, the felt is rejected. Since there is no use for "Second or Damaged Felts", it is imperative that only perfect felts are shipped to customers.

N. T. M. S. Highlights

By
John W. Mathis, Secretary, TM '62

On the first and last Tuesday of every month there is a room in Sirrine Hall that comes to life as some fifteen to twenty students assemble to have their monthly meeting of the National Textile Manufacturing Society. The purpose is to bring about a more intimate relationship between the textile industry and the under-graduates of the textile school.

With the coming year to look forward to, the N.T.M.S. is keeping pace with time. On April 28, 1961, the N.T.M.S. held its election for next year's officers. The results were fascinating with only one or two votes different in some cases. Mickey L. Creach, a rising senior, majoring in Textile Science, from Hartsville, S. C., was elected president of the club. Robert E. Wall, also a rising senior from Charleston Heights, S. C., was elected to the office of vice-president. The other officers elected were: John W. Mathis, secretary; Donald R. Langley, treasurer; and Hall Turner for publicity director.

At present the N.T.M.S. is planning a field trip to one of the South's many textile industries. With the new officers there is very little doubt that the N.T.-M.S. is going to grow and become one of the predominant societies on campus.

1961-62 NTMS Officers seated left to right: Seated: Robert Wall, Vice President; Mickey Creech, President; John Mathis, Secretary; Standing: Donald Langley, Treasurer; and Hall Turner, Publicity Director.

Alumni News

Textile Chemistry

Cranford, Reginald T., Pineville, N. C. Reginald will enter the Army in March, 1962, at Fort Benning, Georgia, for six months. Afterwards, he will work as supervisory trainee for Springs Cotton Mill, Grace Bleachery, Lancaster, S. C.

Hinson, Roger A., Lancaster, S. C. Roger has made no definite plans.

Kernels, Bobby R., Anderson, S. C. Bobby will work for Burlington in Taylors, S. C. He will enter management training and will then be assigned to the Dye House.

Neal, Bobby L., Rock Hill, S. C. Bobby will work for Burlington in Altavista, Va. He will enter management training and then be assigned to the finishing department of the fiberglas plant.

Townsend, Francis A., Jr., Aiken, S. C. Francis is going to work for J. P. Stevens at Delta Finishing, Cheraw, S. C.

Textile Engineering

Ariail, Thomas M., Sevierville, Tenn. Tommy is going to work for Mayfair Mills in Arcadia, S. C.

Textile Management

Adams, Alvin A., Union, S. C. Aubrey is going to enter the I. E. Training Program at Monarch Mills in Union, S. C., upon graduation.

Anderson, William T., Greenwood, S. C. William will be in production training for Deering-Milliken in Gaffney or Spartanburg, S. C.

Arnold, David A., Aiken, S. C. David is planning to work for Burlington at Poe Mill in Greenville, S. C. He will be in production management training.

Buchanan, Kenneth R., La France, S. C. Kenneth is going to do graduate work at the University of South Carolina.

Catoe, James C., Heath Springs, S. C. James is going to work at Springs Cotton Mills, Lancaster, S. C.

Eubanks, Charles E., Lyman, S. C. Charles is going to enter the Army after graduation.

Francis, Steve C., Grover, N. C. Steve plans to enter the service for six months upon graduation. Afterwards, he will go into sales for J. P. Stevens & Co., at Wallace, N. C.

Freeman, Charles L., Rutherfordton, N. C. Charles will work for Deering-Milliken.

Greer, Donald R., Spartanburg, S. C. Don will accept an Army commission in the Artillery branch in Germany. Afterwards, he will be attached to Deering-Milliken's New York Sales Office.

Holstein, Milledge J., Monetta, S. C. Jeff plans to go into the Army for six months and then would like a position in sales.

Hughes, Philip L., Hickory, N. C. Philip will work for Burlington Industries, Cramerton Plant, Cramerton, N. C., in the Fabric Design Department.

Roddey, Robert S., Greenwood, S. C. Bob will work for Self Mills.

Rodgers, Archie D., III, Georgetown, S. C. David plans to make the Army his career. He will be assigned to Fort Campbell, Kentucky, in Airborne Artillery.

Saunders, Steve J., Rock Hill, S. C. Steve plans to go to work with Dan River Mills, Danville, Virginia, after 6 months active duty with Army. Plans to go into Production at Danville.

Simril, Robert M., Clemson, S. C. Robert plans to work in the fabric development department of the Riegel Textile Corp. in Ware Shoals, S. C.

Swart, John B., Caracas, Venezuela. John will work for Tocone Industria Textil, in Caracas, Venezuela, in the Quality control department.

Todd, John D., Spartanburg, S. C. John has no definite plans, but hopes to work in planning and design.

Wellmaker, James A., Ninety Six, S. C. James will work for Self Mills, in Production, in Greenwood, S. C.

White, John T., Jr., Anderson, S. C. John has worked for Woodside in the Weaving and Design department for the past 9 years and will continue to do so upon graduation.

Wingo, John C., Union, S. C. John will work for Gerrish Milliken Mill in Pendleton, S. C., in production.

Young, W. Harral, Jr., Sumter, S. C. Harral will first go on a 6 months training program for Burlington, Pacific Division, Lexington, N. C. He then expects to work in Yarn Manufacturing.

Textile Manufacturing

Carpenter, Dalton O., Jr., stationed in New York. Major Carpenter will go to England upon completion of his degree to continue his career in the Army.

Howe, Charles E., Hemlock Station, Chester, S. C. Charles will go first on a training prrogram at Springs Cotton Mills, White Plant, Fort Mill, S. C. Afterwards, he will go into production.

Stevenson, Robert F., Greenwood, S. C. Robert plans to work in Cost Department of Greenwood Mills.

Stone, Franklin R., Buffalo, S. C. Franklin is undecided as to his future plans.

Textile Science

Adams, James Leander, Jr., Spartanburg, S. C. James has received a deferment from the Army to attend Harvard Graduate School.

Hunter, Orren F., Sr., Clemson, S. C. Frank will enter Institute of Textile Technology in Charlottesville, Virginia. Upon completion of his masters degree, he would like to work in production or research and development.

The Dean says...

(Professor Thomas A. Campbell is pinch-hitting for the Dean in this issue.)

On a recent trip to New York to attend the sixteenth Annual Society for the Advancement of Management and the American Society of Mechanical Engineers, Engineering Management Conference, I had the privilege of visiting the Sales Office of the J. P. Stevens Company located in the Stevens Building on Broadway at 41st Street. This visit to the J. P. Stevens offices was on April 5th and the morning of April 7th. Mr. Marshall Palmer, Vice President of Sales, took me on a tour of the various departments of which there are too many to enumerate at this time. This visit was a most valuable experience. I had no conception of the number of people and the amount of floor space that was required to handle sales, advertising, billing, etc. There are approximately 1500 people employed and about one-third are salesmen. J. P. Stevens has several other sales offices in the United States manned by a few salesmen and office personnel.

During the afternoon I had the pleasure of observing the artists and designers at work creating new designs.

While in the Cotton Dress Goods Division, I saw three of my former students; Mr. George Diamond, '51; Mr. R. S. Calabro, '53; and Mr. R. A. Gullucci, '54. Mr. Gullucci is a salesman in this department and he asked me to accompany him on a selling trip to one of his customers, a cutter, in the City. In my observation of the cutter, it was evident that he was most interested in the hand, the appearance and **the price** of the cloth rather than the technical aspects of it.

The sales personnel through marketing research determine the trend of new designs and patterns accepted by the buyers and in turn notify the manufacturers.

On Friday morning I visited the Utica-Mohawk Sales Division and discovered that their sales policies differed greatly from the other departments. They were selling finished goods, such as sheets and pillow cases, direct to the retail trade.

In talking with some of the top men of this organization, I gathered that they would like to have more men from the southern textile schools to enter the selling and merchandising field.

The Annual Engineering, Management Conference was held April 6th and 7th at the Hotel Statler in New York City. This is the most important meeting of S.A.M. and S.M.E. for the year. The attendance is usually between twelve and fifteen hundred, representing all levels of management and engineering personnel in industry, commerce, government and education.

There are two large meeting rooms on the same floor with two speakers for the morning meeting and the afternoon meeting; also, two rooms for special workshops each day. This is fine because it allows members to hear speakers of their choice or attend the workshop. There are speakers for the luncheon meetings and a speaker for the dinner meeting on Thursday evening.

The members and visitors have a part through a questionnaire in the selection of the speakers and their subjects for the next annual meeting.

Our Mutual Problem

(Continued from page 7)

culties. For years I have tried to convince those controlling these decision that America must remain strong industrially first and, secondly, we must help our friends to develop. They have insisted on giving primary consideration to what other countries will think of us, or to try and buy friendship even at the expense of our own domestic industry. In many instances the State Department has become a state of foreign-mindedness.

Have other countries reciprocated this generosity? They have not! At this writing there are 52 countries that have a virtual embargo on our cotton textile goods, and 22 others that have substantial restrictions against them. In return we have systematically reduced our tariffs until we rank next to Canada as a free market, and every foreign textile manaufacturer in the world is greedily eyeing the American market. Only a fool would think our U. S. market can support the textile industry of the world

(Continued on page 18)

Outstanding Seniors . . .

By

Robert Ellis, TC '63

Bobby L. Neal

Bob Neal is a Textile Chemistry major from Rock Hill, South Carolina; he is twenty-two years old and is married. Bob received honors the second semester of his junior year and the first semester of his senior year. During his junior and senior years he has held the Ciba Co., Inc. Scholarship.

While at Clemson, Bob has been a member of several organizations. They include two years in Phi Psi; three years in the AATCC — he is outgoing President; one year in the Council of Club Presidents; and one year in the Student Assembly.

Bob has worked three summers with Highland Park Manufacturing Co. and one summer with Celanese Fibers, both companies located in Rock Hill. When he graduates at the end of this semester he will be employed by Burlington Industries as a management trainee in fiberglas finishing at Alta Vista, Virginia.

Mitch Allen, a twenty-one year old Spartanburg, South Carolina, native, is a Textile Science major. He has had experience working in various departments of Beaumont Mills during several summers.

Mitchell D. Allen

Mitch graduates in January of 1962 so he does not have a definite job, but he hopes to remain in the South and work in production or planning.

He is enrolled in Army ROTC and hopes to be commissioned for six months in the Quartermaster's Corp immediately after his graduation.

Mitch was in the Pershing Rifles, and has been a member of Phi Psi for two years. He served as Senior Warden this year. Mitch received honors three times: first semester freshman, and first and second semesters his junior year.

Steve Francis is a twenty-two year old Textile Management major from Blacksburg, South Carolina. He is unmarried and has no military plans so far.

Steve has done summer work with two companies: Minette Mills in Grover, North Carolina, and Gaffney Manufacturing Co., in Gaffney, South Carolina.

Steve has participated actively in several phases of the intramural sports program. He has been a member of Phi Psi for the past two years.

After his graduation in June, Steve will be employed by J. P. Stevens & Company, Inc., at Wallace, North Carolina, where he will work in production and sales.

Steve C. Francis

Progress in Textile Dyeing

By

Maurice Goldemberg

Textile Chemistry — Dyeing Department

School of Textiles

Clemson, S. C.

The textile industry is undergoing a revolutionary change under the impact of 3 main factors:

1. Growing awareness on the part of the consumer that better fabrics are getting increasingly available.
2. Increased tempo of scientific progress, in developing new dyeing concepts, and better dyes; this activity is interlaced with the eclosion of a host of new fibers and modifications of the older ones.
3. Automation.

A few examples of these factors are reviewed below:

1. **The Consumer:** This writer remembers the misfortune of a friend who went out for a stroll one day, wearing a stylish red silk tie bought in an exclusive shop, because he could afford the best; he was caught in a rain; the red dye bled mercilessly over his white shirt.

That was a generation ago. The term "washable" was already well known; stores were loaded with cotton "wash dresses", there was even talk of washable silk; but no one really expected washability or even cold water fastness from a beautiful silk fabric.

The victim knew the score well; he was the head dyer of a prominent silk dye-house.

Much progress took place since. The quality of the average textile is higher than ever before; we have labeling laws; informative labels often give us unequivocal guarantees of wash and wear quality.

Yet, when an average consumer purchases a well tailored suit, made of a fabric resembling a convential worsted, he will hesitate to wash it, regardless of the label's assurances; he will rather have it dry cleaned.

Strange to say, some bold traders have taken a calculated risk, based on this consumer psychology; a rather poor quality "wash and wear" was sold, on the assumption that few people would launder the cloth, and only a few "cranks" would complain.

Obviously no money-back guarantee will ever repay the long range damage thus inflicted on a whole industry; if such merchandise is exported, the nation's good name suffers.

2. **Technological Progress:** If one looks back to the 1930's, it will be found that there was a "revolution" in those days: The development of formulation.

The art of dyeing and finishing was a hodge-podge of recipes, guarded jealously by each individual dyer and finisher. Formulation opened a new chapter in the dye-houses. From then on, each dyeing was conducted in a pre-determined way, with an accurate dye formula, recommended or even worked out by the laboratory chemist. Quality and efficiency were greatly improved and management could even know ahead of time the cost of processing a given yard of goods.

One could also visualize the gradual formation in each firm of a real library of shades and finishes, as a lasting monument to human progress.

But it was quickly found that formulas were rather short-lived in a fast changing world.

The 1930's witnessed also the coming of age of 2 man-made fibers: Viscose and cellulose acetate. They heralded the problems of the new textile age. The early fabrics had a gaudy glitter; dyeings were often skittery, with bare effects. The cellulose acetate was in fact hardly dyeable until a new dye method was evolved: instead of the usual water soluble dyes, the disperse dyes came up, nearly unsoluble in water, but soluble in the fiber.

Other laboratory studies made possible in the 1940's the development of continuous vat dyeing methods: The Pad-Steam range and the Williams unit for cottons and rayons. Then the war speeded the introduction of Nylon 6.6, the first truly synthetic fiber. With it, came new problems: besides the uneven dyeings, there was the inability to get dark shades and the blocking of one dye by another.

Satisfactory explanations and remedies for these problems came only gradually, through improvements in the fiber and in the dyestuffs.

Recent Developments: The 1950's are characterized by the eclosion of many man-made fibers; then variants appear to extend the use or dyeing qualities of the original ones; or to replace them.

I. The original studies of Dr. W. Carothers (DuPont) on **polyamides** produced the nylon 6.6; represented below in 1-a.

A close relative, Nylon #6, competes with it, based the German Perlon, given below in 1-b.

A more distant relative is the French Rilsan (Nylon 11). All are linear polymers, with different structures and physical properties: melting point, porosity, dye affinity.

II. The **1st acrylic** fibers were the Orlon #41 and #81, (DuPont); probably acrylonitrile homopolymers. The structure is represented in 1-c.

Orlon #41 was almost undyeable, until a new dyeing method came up, developed by Union Carbide for its own Dynel fiber: The Cuprous ion, which acts as a mordant for acid dyes, Orlon #41 is now replaced by copolymers, especially the Orlon #42, dyeable with basic dyes at normal atmospheric pressure; these dyeings are of excellent quality.

The Acrilan 1656 (Chemstrand Corp.) is another example of a copolymer of acrylonitrile and another constituant, possibly vinyl pyridine.

It has a variant, acrilan 16, with different dyeing characteristics. Graph I (1-f) illustrates how both can supplement each other in producing cross-dyeings of good fastness, when woven in the same fabric. This graph is taken from the Acrilan and Arcilan 16 dyeing manual, published by the Chemstrand Corp.

Note: In Graph I: Dyeability of Acrilan #16 with basic dyes is largely unaffected by increased acidity while the dyeability of Acrilan #1656 drops drastically. With acid dyes, the dyeability of Acrilan #1656 increases with the acidity, while Acrilan #16 has no affinity for acid dyes.

A final example of Acrylics is the case of Zefran, (Dow Corp.), a nitrite alloy reported to contain in addition to acrylonitrile, minor amounts of vinyl pyrrolidone; it has an unusual dyeability with many classes of dyes, including vats and naphthols. However, the bright basic dyestuffs give dyeings of only moderate fastness to light and wash. In all cases above, the acrylonitrile is now copolymerized with monomers capable of acting as bonding agents in dyeing: a) Acidic monomers introduce sulfonic or carboxylic groups, to react with basic dyes. b) Basic monomers introduce amino or pyridine groups, to react with acid and direct dyes. c) Non-ionizing monomers introduce vinyl acetate or acrylamide groups capable of forming complexes with disperse dyes.

III. Dacron was the **1st** polyester in this country, based on the British Terylene. Its structure can be seen in 1-d.

While it will accept disperse dyes like the cellulose acetate, its rate of dyeing is extremely low except above 100° C. at higher pressures. The introduction of carrier dyeing made normal pressure dyeings possible commercially.

The mechanism of carrier action has been subject to debate. It seems that, by penetrating the fibers, the carrier loosens the bonds between fiber molecules; the disperse dye can then replace the carrier on the fiber sites.

Here again, there is a copolymer Dacron #64 with acidic groups, enabling it to be dyed with basic dyes.

Against the modern synthetics, all based on linear polymers, it is good to recall the branched structure and various cross-linkages of wool, given below in a simplified form: (1-e)

This structure provides many sites for dyestuffs and explains the physical stability of the fiber.

Other Factors: The right polymer is not the only controlling factor in dye problems. A cationic-type lubricant on a fiber can change its dyeability. Finally, modern resin finishes actually modify the fibers and influence the choice of dyestuffs. Cotton is the best example of this development. The newer synthetics may see the same trend.

Theoretical Studies on Dyeing: The mechanism of dyeing of all fibers is subject to an intensive study. It is spurred by the need to fashion properly the newer fibers. This is a rather new field of study, based on a better knowledge of the structure of fibers,

natural and man-made, and of the nature of the solutions or dispersions of dyestuffs.

As an example: Vickerstaff (2) and Zollinger (3) studied 3 types of dye isotherms. See Graph II. (1-g)

1. The N type represents the actions of disperse dyes on acetate.

2. The L type represents the stochiometric action of anionic (acid dyes) on silk, wool, nylon or vice versa, the action of basic (cationic) dyes on acrylonitrile.

3. The F type represents the action of direct dyes and leuco-vats on cellulosics; here a purely physical affinity to a surface takes place, thru a Van der Vaals effect.

It was also found that a simultaneous effect of 2 of the mechanisms can take place with some dyestuffs Studies of this type act as a guiding light in the search for new, more satisfactory dyes.

Other studies lead to unusual developments: In the Thermosol process, dacron is now dyed in a continuous process, where the dyeing cycle is reduced from a few hours to a few minutes.

The Monfort reactor (4) uses a pressure device to dye continuously a variety of fibers.

The reactive dyes for Cellulosics were introduced 5 years ago; here a high grade dyeing may be produced in a continuous process of pad-steam. It can even be applied with common resins in the finishing operation.

Still another simultaneous dyeing and finishing operation is possible in pigmented emulsion dyeing, quite useful in blends.

Automation: The Electro set process (5) represents an approach to automation in Nylon dyeing. It has been developed to scour, dye at high temperatures, finish, set, and dry nylon hosiery in one continuous operation. It uses an automatic photo-electric control of the color of the dye bath. The shade of the finished product is reported to be acceptable even if it does not control directly the dyestuff feed.

Conclusion: This rapid survey of modern dyeing accomplishments emphasizes the growing complexity of this industry.

A. Rapid technological progress takes place in this country as well as in Europe, Japan, etc.

B. It is remarkable to note that we are only emerging from the empirical methods of the past; we are beginning to know how to tailor a new fiber to make it dyeable with known dyes; vice versa, new and better dyes are made for the existing fibers.

C. Some of our oldest fibers may remain, more or less modified, while some of the newer "miracle" fibers are disappearing already; much better fiber will undoubtedly be produced.

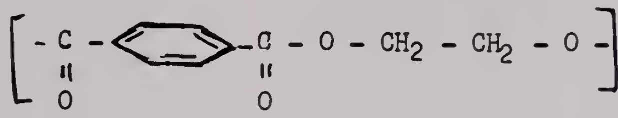
D. Textile progress is the result of a vast cooperative effort, based on a sound theoretical knowledge of fibers and dyes. Quality at a price, is the surest key to lasting success.

1a - Nylon 66 $\left[-NH-(CH_2)_6-NH-CO(CH_2)_4-CO- \right]_n$

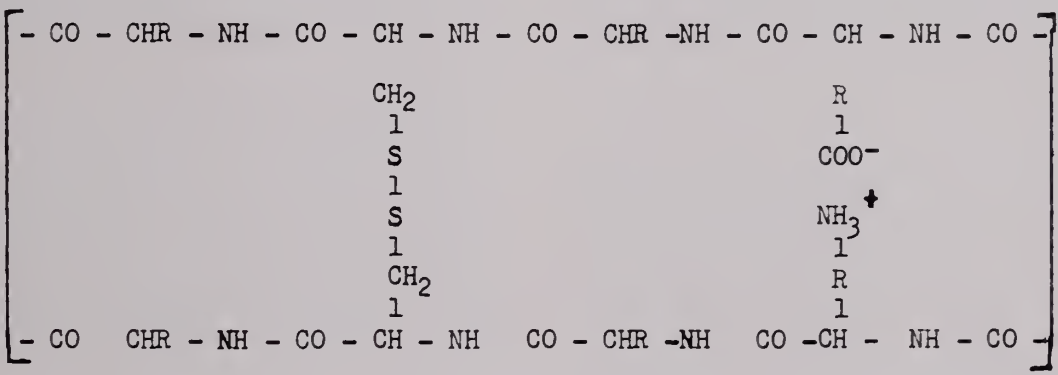
1b - Nylon 6 $\left[-NH-(CH_2)_5-CO- \right]_n$

1c - Orlon $\left[-CH_2-CH(CN)- \right]_n$

1d - Dacron

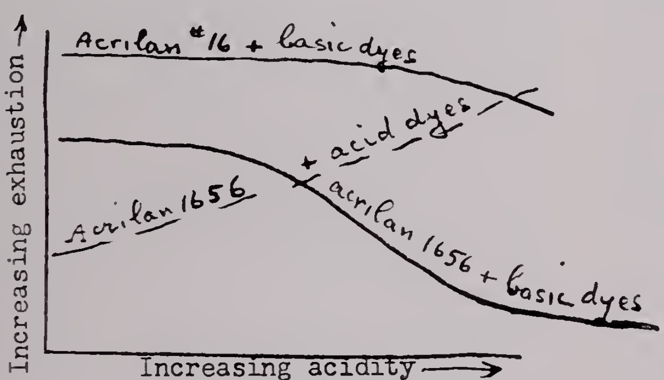


1e

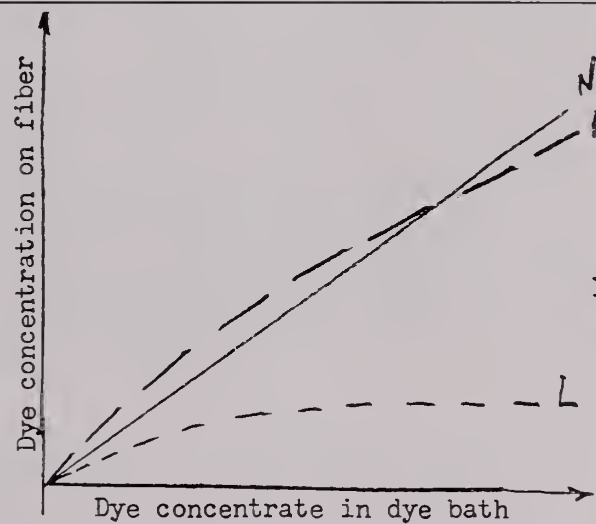


R represents various side chains

1f



Graph I



1g

Graph II

References:

1. 1-a to 1-e: Structural formulas.
2. 1-f and 1-g: Graphs.
2. Vickerstaff — Physical Chemistry of Dyeing — 1954 edition
3. Dr. Zollinger — Pallette #6 — Winter 1960
4. J. Roehl — American Dyesuff Reporter — May 16, 1960
5. J. S. Christie — Automatic Color Control, American Dyestuff Reporter — April 17, 1961

Background of Author:

Mr. Maurice Goldemberg was born in Paris, France.

Chemical Engineering degree, National School of Chemistry, Paris. M.S., Sorbonne, University of Paris.

Industrial experience:

Laboratory Chemist in Sunbury Converting Works, Sunbury, Pennsylvania.

Laboratory Chemist, Plant Chemist, and Supervisor of Silk Weighting, United Piece Dye Works, Lodi, New Jersey.

Director of Dye-house, United Piece Dye Works, Charleston, S. C.

Mr. Goldemberg is now Associate Textile Chemist, Clemson College.

Our Mutual Problem

(Continued from page 12)

without destroying our own industry and throwing an additional one to two million people out of work! When we start putting millions of Americans out of work, the great American buyer everyone is eyeing so eagerly disappears and we have instead the great American bread line. There is no reason to wait until this happens and we have to try to restore these people to jobs—when we can prevent this happening very easily.

What we need is recognized by anyone who has any knowledge of the textile industry. What we need, as recognized by owners, managers, labor, suppliers and the Senate subcommittee alike, are realistic and mandatory quotas by country and category.

Two years ago after extensive hearings the Senate subcommittee recommended strongly that such quotas be established. Just as my earlier requests had gone unheeded, so were the recommendations of the subcommittee unheeded. The previous administration maintained that existing legislation and directives offered relief through the "peril point" and "escape clause" provisions. These provisions have proved ineffective because they are too cumbersome and time-consuming, and because the previous administration refused to apply them.

I have reason to believe, however, that under our new administration we will at last find some of the relief from these low-cost goods that we have long been seeking. Shortly after the inauguration of President Kennedy I discussed this problem with him at length. I am confident he understands it and is realistic about the inherent dangers of continuing our past course. He has appointed a Cabinet-level committee consisting of the Secretaries of Labor, Agriculture, Commerce, and Treasury and an Under Secretary of State to study the textile problem and suggest action. I was happy to see the makeup of this committee, and I have contacted every member.

The Secretary of Labor should have foremost in his mind the effect of the deterioration of our textile industry on the 2,000,000 textile and apparel workers.

The Secretary of Agriculture will be concerned with the damaging impact of imports on our cotton and wool producers.

The Secretary of Commerce can't help but be appalled at the distruction of one of our oldest and largest industries, and one with which he had direct contact as a former Governor of North Carolina.

It should also be obvious to the Secretary of the Treasury that our country stands to lose fantastic sums of money by eliminating ourselves as a textile manufacturer and becoming merely a consumer of textiles and an exporter of dollars.

No longer will the decision on quotas be made solely by those who think first of foreign countries and, secondly, of our own people. Instead, the President has appointed a representative committee that should consider every aspect of our dilemma.

When we were originally dealing only with the matter of textile imports from one country, our people could protect themselves fairly well, but today with Hong Kong, Japan, Great Britain, Egypt, Portugal, Spain, India, France, Korea, Formosa, and Pakistan, as well as dozens of others flooding the markets of the world, we must establish a realistic mandatory quota system in order to protect the standard of living of our working people.

In addition, I hope that the International Cooperation Administration will take a more realistic view and purchase more of the textiles it buys from our own people. During the last administration only a very small percentage of ICA purchases were bought at home. For instance, during the fiscal year ending June 30, 1960, the ICA spent 44.3 million dollars for textiles and only 4.5 million dollars, or 10%, was spent in the United States.

This figure become fantastic when you consider it in conjunction with our gold shortage, our efforts to restore the balance of payments, our high unemployment rate during this period, and the big campaign to "Buy American." In addition, our unemployment was at an all-time high and thousands were laid off from work at our textile mills.

There will certainly be a more realistic evaluation made in the future under our new administration, and I expect to see increased purchases of American textiles by the ICA. I also look forward to seeing closer relationship between our officials overseas who have knowledge of potential purchasers and our people at home who have the finest textiles in the world for sale. In the past, communication between our overseas representatives and our domestic producers has been almost nonexistent.

In short, I hope for a completely new attitude toward our textile industry. The indications are that under the new administration we can expect a far better deal. I have been in touch with both the President and his committee on textiles, and I intend to stay in touch with them until we get the relief we deserve.

I, for one, am filled with hope for the first time in over eight years.

Latest Phi Psi News

By

Buddy Holly, Editor of Phi Psi, TM '62

On May 1, 1961, Iota Chapter of Phi Psi awarded an honorary membership at a banquet held at the Clemson House. This honor went to Mr. Frederick B. Dent of Spartanburg, S. C. Mr. Dent is currently President of Mayfair Mills, Arcadia, S. C. Mr. Dent, a graduate of Yale University, is also a trustee of the Sirrine Foundation and of the Institute of Textile Technology. Congratulations to Mr. Dent.

As of February, 1961, we have also invited four new members to join us. They are Spurgeon Brian, a Textile Science major from Wellford; Gene Crocker, a Textile Chemistry major from Enoree; Robert Ellis, a Textile Chemistry major from Huntersville, N. C.; and Archibald "Mac" Calhoun, a Textile Management major from Clio. Congratulations are also in line for these four.

This spring the Iota Chapter is sponsoring a softball team in the Spring Intra-Murals for the first time in many years. There is great interest shown by the members in this team which, at the present, is on the top in its respective league. Win, lose, or draw, Phi Psi will make a good showing for itself in this year's intra-mural softball competition.

On May 7 a social was held at the Hilltop Supper Club in Greenville. It was attended by most of the members, their wives or dates, and Mr. and Mrs. David E. Gentry. Everyone seemed to enjoy the dining, dancing, and fellowship. Iota Chapter will not soon forget the Hilltop's chief musician, "Crazy Horse."

Iota Chapter will lose the following brothers via graduation in June: A. Aubry Adams, James L. Adams, Jr., Thomas M. Ariail, David A. Arnold, Kenneth R. Buchanan, Reginald T. Cranford, Charlie E. Eubanks, Steve C. Francis, Don R. Greer, Orren F.

1961-62 Phi Psi officers seated left to right: Crawford Love, Vice-President; Charlie Hagood, President; Gene Phillips, Secretary. Standing: David Bevill, Junior Warden; Mitch Allen, Senior Warden; Tom Templeton, Treasurer.

Hunter, Bobby L. Neal, Archie D. Rodgers, John B. Swart, Francis A. Townsend, and W. Harral Young, Jr.

Among those planning to do graduate work are Brothers Adams, Buchanan, and Hunter. "Jay" Adams has received a fellowship to Harvard, while Frank Hunter has received a fellowship to the Institute of Textile Technology, Charlottesville, Virginia. Kenneth Buchanan plans to attend the University of South Carolina, Columbia, South Carolina. We all wish these men the best and feel sure that they will make the best.

The T. C. Club Report

By

Jerry Byrd, Secretary

The T. C. Club has been on two field trips since the last report was made. One was a trip to Ware Shoals and the other trip took us to Greenwood. At Ware Shoals, we went through the Riegel Finishing Plant. After going through the printing and dyeing sections, we went through the roller engraving sections of the plant.

1961-62 A.A.T.C.C. officers standing left to right: Joe Belcher, Treasurer; Jerry Byrd, Secretary; Stan Rose, Vice-President; Gene Phillips, President.

After dinner, we went through the Chemstrand nylon plant in Greenwood. We saw how they start out with the flake and end with nylon yarn.

The T. C. Club also went through the Excelsior Finishing Plant at Pendleton.

The T. C. Club elected the following students as officers for the 1961-1962 school term: President, Gene Philips; Vice-president, Stan Rose; Treasurer, Joe Belcher; and Secretary, Jerry Byrd.

New Scholarship Awards For 1961-62 Announced

Blackmon-Uhler Scholarship ($250) — Robert C. Hartzog; Blackmon-Uhler Scholarship (250)—Gerald S. Rose, Camden; Chemstrand Scholarship ($500)—John W. Mathis, Converse; *Ciba Scholarship ($500)—David A. MacEwen, Greenville; Geigy Chemical Co., Scholarship ($250)—Jerry Ned Pruitt, Duncan; Ben and Kitty Gossett Scholarship ($300)—Jerry L. Witt, Saluda; David Jennings ('02) Memorial Scholarship (300)—Wm. E. Barrineau, Jr., Cades; Keever Starch Scholarship ($400)—Lloyd E. Foster, Seneca; Owens Corning Fiberglas Scholarship ($500)—Charles C. Hagood, Easley; Seydel-Woolley Scholarship ($300)—Spurgeon B. Brian, Wellford; Sonoco Scholarship ($500)—Russell H. Lawrimore, Mullins; Sonoco Scholarship ($500)—George L. Harmon, Jr., Chesterfield; South Carolina Textile Manufacturers Association Scholarship (Special) ($250)—Thomas W. Templeton, Greenwood.

*May be renewed for 1962-63.

P L E A S E !

Changed Address Lately?

Help us to keep our files up to date. Our sincere thanks to all of you who answered our appeal in the last issue. If you haven't answered, please fill in the form below and mail to:

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Name ____________________

Position ____________________

Mill or Company ____________________

Local Address ____________________

REMEMBER

For the fourth summer the School of Textiles is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for the college graduates, other than textile school graduates, who will enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

COURSES

Yarn Manufacturing—Theory and Laboratory—Date Offered—June 12 or July 10, 1961

Fabric Development—Theory and Laboratory—Date Offered—July 11, 1961

Supervisor Development—Theory—Date Offered—June 12 or July 10, 1961

Quality Control—Theory—Date Offered—July 10, 1961

Motion and Time Study—Theory and Laboratory—Date Offered—June 12, 1961

For Additional Information Write:

Gaston Gage, Dean
School of Textiles
Clemson, S. C.

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Clemson, S. C.

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Sponsoring Company ______________ Address ______________

Course Desired ______________ Date of Course ______________

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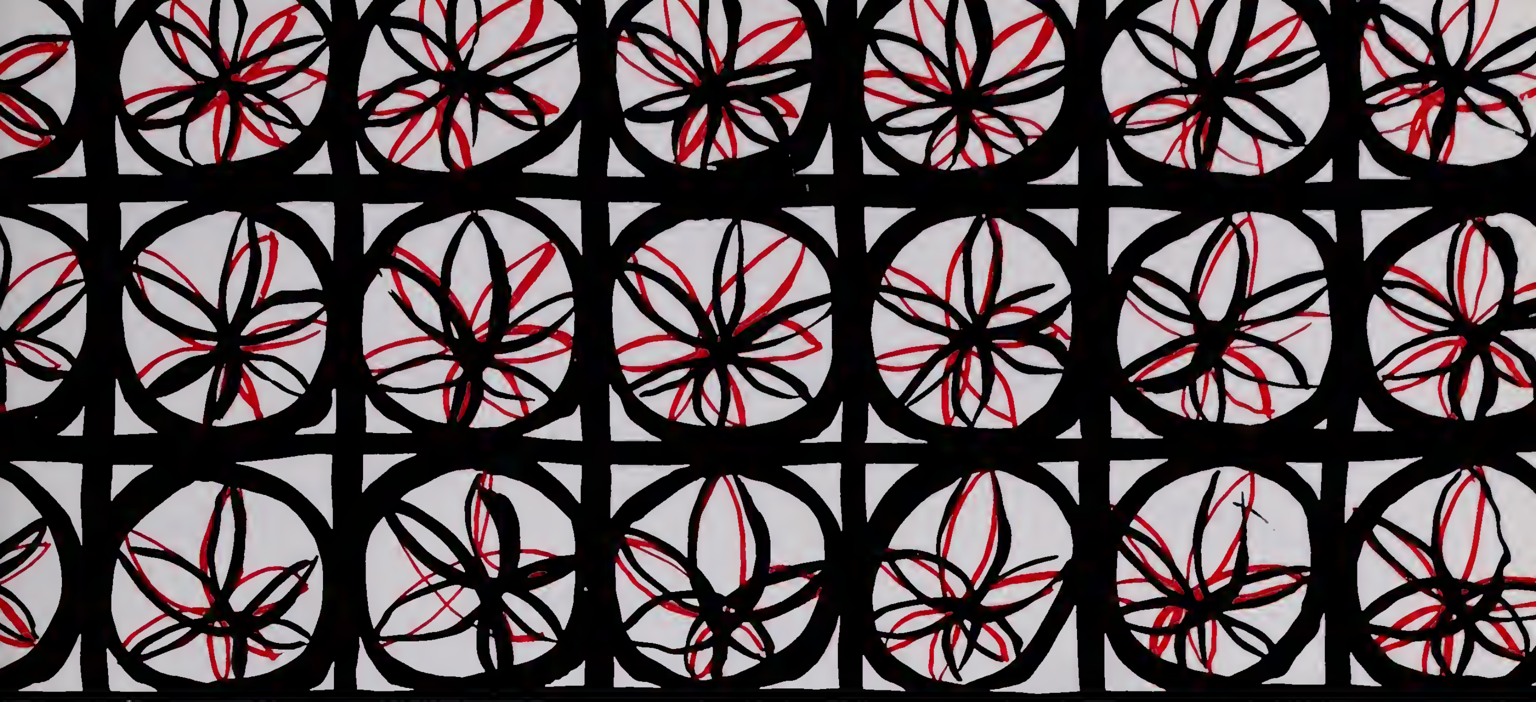

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CLEMSON FALL 1961

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In This Issue

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from the Editor

In this issue, the staff has tried to make the mill employee more aware of cotton before it reaches the opening room. Mr. Warren Garner enlightens many of us in his "Recent Developments in Cotton Ginning." Mr. Roy Davis re-emphasizes the importance of research in "Utilization Research of Cotton." The Kendall Company's new testing laboratory report will be of interest to our many readers.

We thank everyone for such a good response to our Alumni News and encourage others to send to us their past experiences. We the staff, hope that as you read these articles, you will approach them negatively. The cotton in the raw state is important. One can not always confine his interests to his immediate area. Look around and realize that others have problems; especially since these problems definitely affect **you** in the mill.

—R. E. W.

The 1961-62 Bobbin and Beaker staff seated from left to right: Crawford Love, Circulation Manager; Barry Barrineau, Managing Editor; Robert Wall, Editor; Charlie Hagood, Advertising Manager; Norman Guthrie, Business Manager.

Research Utilization of Cotton

By
Mr. Roy B. Davis

Research has brought about great changes in the cotton industry during the past 20 years. From raw fiber to finished fabric, every step of the manufacturing cycle has been affected.

In mechanical processing, emphasis has been placed on technological improvements designed to increase efficiency and lower costs. Since the end of World War II, a new philosophy of modernization has become evident. Larger packages, automatic cleaning devices, and machinery improvements such as anti-friction bearings have increased the productive capacity of each worker to the extent that cottons are produced at rates which would have been called impossible 15 years ago.

The greater efficiency of improved cotton mill machinery has whittled down still another important cost factor — that of processing waste. A recent survey of more than 200 cotton mills shows that average processing waste has declined from 18% in 1930 to 13% in 1958.

Research continues to seek improvements in equipment and better methods of processing. The establishment of a pilot spinning laboratory at Clemson has come about as a result of the industry's awareness of the shortcomings of conventional fiber testing methods. As fiber and processing data are accumulated at the pilot laboratory, studies will be undertaken to discover how and to what extent fiber properties influence processing performance. When these relationships have been established, rapid and accurate tests will be devised. Eventually, work at the pilot laboratory should make it possible to develop means for measuring cotton's use value fully.

The remarkable progress brought about by research in mechanical processing has done much to enable the cotton industry to maintain reasonable costs in an expanding economy. The truly revolutionary change, however, has taken place in the art and science of cotton finishing. Today's new concept of finishing, which actually had its beginnings many years ago, involves the use of chemical instead of additive finishes on cotton. Chemical finishes react with the cellulose molecule to provide many new qualities which consumers find desirable. Because these finishes are chemically bonded to cotton they exhibit permanence which is not attainable with additive treatments.

Mr. Davis is a graduate of Lubbock High School and Texas A. & M. College. Following graduation from A. & M. in Agriculture, he served five years as County Extension Agent; some eight years as manager of a cooperative creamery; then four years as vice president and secretary of the Houston Bank for Cooperatives; and during the past 18 years, he has been manager of Plains Cooperative Oil Mill.
Mr. Davis is a past director of Texas A. & M. College, and served several years as a member of the Cotton and Cottonseed Research and Marketing Advisory Committee of the USDA. He is a delegate to the National Cottonseed Products Association, a director of the National Cottonseed Products Association, and is associated with several of the area groups that are identified with promotion of cotton.

A good example of the properties which may be imparted to cotton through chemical finishing can be found in the wash-wear or easy-care development. The original research leading to the present finishes actually dates back to the late 1920's. During the early years, the textile and chemical industries largely over-looked the possibility of using cotton as a base for chemical finishes. After World War II, however, these chemicals were applied in volume to cotton, and resulted in the crushproof and crease resistant finishes of the early 1950's.

Since then improvements in easy-care finishes have come thick and fast. Melamine-formaldehyde precondensates, an improvement over urea-formaldehyde products, were introduced shortly after World War II. The cyclic ureas followed in the early 1950's. Now, one of the most commonly used of the cyclic ureas is dimethylol ethylene urea. Still more recently, several new types of cellulose-reactant creaseproofing chemicals, such as acetals, epoxides, triazones, and specially modified triazine compounds have been introduced. Each offers improved creaseproofing properties over formerly used compounds, particularly for white fabrics.

The acceptance of easy-care cottons by the consumer is graphically portrayed by recent production figures.

Production of Resin Finished Cotton Fabrics, 1955-1959

	Million Linear Yards
1955	600
1956	800
1957	1,100
1959	1,500
1959	1,900

(Derived from "Easy-Care Cottons," National Cotton Council of America, June 1960)

From a level of 600 million linear yards in 1955, production of resin finished cotton fabrics has moved upward sharply to an estimated 1.9 billion yards in 1959. While the rate of increase has leveled off, current interviews with cutters and retailers indicate that the growth trend is still upward. Furthermore, a leveling off in production suggests that consumers are looking for further improvements in easy care qualities; not that the demand for easy care products has been saturated.

The following table shows cotton's position, in 1959, among the other major types of easy-care fabrics:

Estimated 1959 Production of Easy Care Fabrics

	Billion Lin. Yds	% of Total
Cotton	1.93	63
Rayon	.38	13
Cotton-Synthetic Blends	.13	4
Synthetic Blends	.07	2
Glass Fiber Fabrics	.10	3
Nylon	.27	9
Polyester Fibers	15	5
Other Synthetic Fiber	.03	1
	3.06	100

(Derived from "Facts for Industry," M22T and M22S, Bureau of the Census, U. S. Dept. of Commerce)

These figures give adequate proof that past research on easy-care properties for cotton has paid off in a big way.

Consumer demand for improved easy-care cottons has lead research to what could easily be called the most significant development in easy-care finishes since their inception. New finishes, which are just becoming commercially available, promise to bring cotton closer than any other fiber to the ideal in wash-wear performance. By providing cotton with an optimum combination of both wet and dry wrinkle resistance, the new easy-care finishes completely eliminate the need for messy drip drying. These finishes are, in addition, non-chlorine retentive, non-yellowing, completely bleachable, and unaffected by high laundering or drying temperatures. The time is close at hand when all easy-care cottons can carry the simple instructions, "wash and dry in any way you please".

Easy-care cotton is a highly successful example of the accomplishments of chemical finishing. Equally great opportunities lie in other areas. Chemical finishes are applied to easy-care cottons to give them a memory for the flat, unwrinkled state. By applying these same treatments to highly twisted or crimped cotton yarns, the yarn can be given a mem-

(Continued on page 18)

The Kendall Company Cotton Testing Laboratory

by
L. D. Pryor

The Kendall Co.'s Textile Division has recently completed the construction of a new cotton testing laboratory in Newberry, S. C. Formerly most of the Kendall's fiber testing operations were conducted at the company's research laboratories in Charlotte, N. C.

The new laboratory now adjacent to the cotton buying office is designed to provide the company with an expanded fiber testing program as well as reduced sample handling and shipping costs. Closer communications between the laboratory and the cotton buying office, as well as between the laboratory and the mills can be maintained.

The laboratory, rather than become a part of the cotton buying, continues to remain under the jurisdiction of the research department which it is felt gives it a greater value to the company as a whole in carrying out its three basic functions which are:

(1) A service-type testing for the cotton buying office is provided. This becomes most active as the new crop cotton begins to become available on the market. Believing very strongly in the old adage that "an ounce of prevention is worth a pound of cure" great emphasis is placed on pre-purchase testing of cotton from the various buying points and areas in which the company is interested. Since neither facilities nor time are available for testing on a 100% basis for all the desired fiber properties, this program is kept flexible and more emphasis is given to certain fiber properties during certain years and even within the buying season itself.

After 3 years in World War II, Mr. Pryor attended University of Tennessee and graduated in Microbiology and Chemistry. In 1951 he received his M.S. Mr. Pryor then joined Kendall Research Labs.

(2) Special fiber testing is provided for the mills to help them to make better use of the cottons on hand in relation to greater processing efficiency and better quality of end product.

(3) Fiber research projects are conducted. In recent years special emphasis has been placed on various things which cause a decrease in the fiber length distribution. Such things as the physical damage from over-machining, chemical damage from over-heating of the fibers, and damage resulting from weathering, microbial attack, etc., have been investigated in the laboratory as well as by mill tests. In several instances new and faster techniques have been developed for detecting these types of damage. Also some experiments have been done in conjunction with the breeders who are further trying to improve the fiber properties of cotton.

Physical tests conducted at the laboratory include fiber strength, fineness, maturity, nepping tendency, length distribution, and percent waste in the fibers.

Fiber strength tests are made with the Scott-Clemson bundle tester. For years Kendall has used 1/16" gauge length rather than the conventional 0 gauge or more recently the 1/8" which does not seem to be readily accepted by the cotton industry. Fiber strength is highly associated with yarn strength and plant running conditions, including ends down in spinning and weaving efficeiency.

Fiber fineness is tested with Spinlab's self contained Speedar instrument which may be moved easily from one location to the other. The values are read off in micronaire units; however, not only is a narrow range of fineness desirable, depending on the on the end product of course, but when wide differences do occur it is essential to know about these and to blend them properly. Coarse cottons do not process very well, and fine cottons tend to have a high nepping tendency which cause imperfections in the yarn and uneven dyeing in the cloth. Fineness is measured for the mix as well as at subsequent places in procesing.

Fiber length measurements are made on another Spinlab testing instrument, the Digital Fibrograph. This machine measures the long part of the fiber distribution in addition to the short fiber content. Fiber distribution, especially short fibers (one-half inch and less) have a great influence on running conditions. High short fiber content in the raw stock means more lint, fly and waste in processing as well as more ends-down in spinning and a poorer quality yarn. Fiber length distribution of the mix as well as

(Continued on page 11)

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Alumni News

Class of 1924

WHITE, JESSE A., a textile major from Chester, S. C. Since graduation, Mr. White has worked for Erlanger Mills, Cleveland Cloth Mills, Slater Mills and Republic Mills. At present he is Vice President and General Manager of J. P. Stevens and Company, Inc.

SHIRLEY, LEVI R., a textile major from Langley, S. C. Mr. Shirley is now employed by United Merchants and Manufacturers, Inc., as manager of Bath Mill Division in Bath, S. C.

STRIBLING, R. S., a textile major from Lancaster, S. C., employed by Springs Cotton Mill. Mr. Stribling is General Manager of Grace Bleachery in Lancaster, S. C.

TOLLESON, LOUIS C., a textile major from Greenville, S. C. Mr. Tolleson is now employed by Cone Mills as Chief Engineer of their Finishing Division in Greenville.

Class of 1926

TAYLOR, WALTER HERMAN, a textile engineering major from Laurens, S. C. Since graduation, Mr. Taylor has been card room overseer, superintendent, general superintendent, and is now General Manager of Pelzer Mills, Kendall Company, Pelzer, S. C.

CARPENTER, ERNEST W., from Greenwood, S. C. Mr. Carpenter is now manager of Cotton Department of Greenwood Mills.

SAUNDERS, J. H., a textile major from Chester, S. C. Mr. Saunders is now Manager of Springsteen, Springs Cotton Mills.

SMITH, GEORGE A., from Greensboro, N. C. Mr. Smith is presently Manager of Quality Control for Cone Mills Corporation.

Class of 1929

VINCENT, WALTER DURELLE, a textile industrial education major from Orangeburg, S. C. Since graduation, Mr. Vincent has worked as a Textile Instructor in Great Falls, S. C., and as Principal of Danville, Virginia Textile Trade School. He has also been Personnel Director of Dan River Mills and presently is Superintendent, No. 1 Division, Dan River Mills, Inc.

ADAMS, JAY L., from Spartanburg, S. C. Mr. Adams is presently General Superintendent of Beaumont Division, Spartan Mills.

FUNDERBURK, OSCAR F., from Greenville, S. C. Mr. Funderburk is now Standards Supervisor of the Lyman Plant for Wamsutta Mills, Inc.

PITTS, IRA J., from Union, S. C. Mr. Pitts is presently Manager of Monarch and Ottaray for Monarch Mills in Union.

Class of 1932

HOFFMAN, HENRY C., a textile chemistry major from Sumter, S. C. Mr. Hoffman is now Head Colorist for Santee Print Works in Sumter, S. C.

HOWZE, WILBER KELLY, a textile chemistry major from Sumter, S. C., employed as a night superintendent. Mr. Howze works for Santee Print Works.

RHINEHEART, JAMES BERRY, from Winnsboro, S. C. Mr. Rhineheart is now serving in the capacity as Overseer in Card Room for Winnsboro Mills, U. S. Rubber Company.

SUBER, HENRY W., from Great Falls, S. C. Mr. Suber is now Assistant General Manager in Rock Hill for J. P. Stevens & Company, Inc.

WILLIS, THOMAS JERALD, from Danville, Virginia. Mr. Willis is now Assistant Superintendent of Division #1 for Dan River Mills in Danville.

Class of 1934

ADAMS, L. M., from Cramerton, N. C., employed by Burlington. Mr. Adams is now overseer of Cloth Dyeing in the Cramerton Plant.

LYNES, O. B., from LaGrange, Georgia. Mr. Lynes is now Sales Assistant for Callaway Mills Company in the Val Way Plant.

METTS, WILLIAM P., from High Shoals, North Carolina. Mr. Metts is presently Shift Overseer in the Weave Room for Burlington in the Carolinian Plant.

SHARP, BENJAMIN K., from Albemarle, North Carolina. Mr. Sharp is now Superintendent of Norwood Plant, Collins and Aikman Corporation.

SIMONS, DAVID E., from Fieldale, Virginia. Mr. Simons is now serving as Superintendent at the Towel Plant, Fieldcrest Mills.

Class of 1939

MONTGOMERY, JAMES B., from Martinsville, Virginia . Mr. Montgomery is now Vice-President in charge of Sales for the Walker Knitting Company.

SMITH, JOSEPH GORDON, from Statesville, North Carolina. Mr. Smith is serving in the capacity of Quality Control Engineer for Statesville Division, Seminole Mills, Inc.

Outstanding Seniors . . .

By Gene Crocker, T.C. '63

Charles Cleveland Hagood

One of Clemson College's busiest seniors is Charlie Hagood, a Textile Science major from Easley, S. C. Charlie has ranked high on scolarship from his first year at Clemson, having attained the "Honrs" list his freshman and sophomore years and the "High Honors" list his junior year. He is a Presbyterian, is single, and 21 years old.

He has been a member of the Freshman Drill Team and the Pershing Rifles. He is presently a member of Delta Kappa Alpha and was president during his Sophomore year. Charlie is a member of the Council of Club Presidents, the Interfraternity Council, and the Student Senate. He is to be one of Clemson's delegates to the State Student Legislature this year.

Charlie serves as president of the Blue Key honorary fraternity and Phi Psi, the Textile honorary fraternity. He attended the Phi Psi national convention last year. At present he is Advertising Manager of the **Bobbin and Beaker.** He is also Director of Tigerama this year.

He has worked four summers in the textile industry and holds a scholarship from Owens-Corning Fiberglas.

Thomas Crawford Love

Crawford Love has been a member of the **Bobbin and Beaker** for three years, and this year serves as its circulation manager. He is a Textile Management major from Spartanburg, S. C., is 21 years old, and is married. He was a member of the Freshman Drill Platoon and served as assistant Drill Platoon instructor his sophomore year. He attained the "Honor" list his junior year. He is Vice-president of Phi Psi, the textile honorary fraternity.

Crawford has worked in the textile industry for six summers at Mayfair Mills, Arcadia, S. C.

Upon graduation, he would like to go into textile production.

Roy Engene Phillips

Gene Phillips is a Textile Chemistry major from Rock Hill, S. C. He is 22 years old, married, and the father of a daughter, Sharon Denise. Gene has been very active in getting the student chapter of A.A.T.C.C. started at Clemson and serves this year as its president. He achieved "Honors" during his freshman and junior years, and made the "High Honor" list during his sophomore year. He is a member of Phi Psi, and attended the Phi Psi national convention last year. Gene is also a member of the Council of Club Presidents. He was a member of the track team his freshman year.

Gene worked this past summer at Excelsior Finishing Plant, Clemson, S. C. He has received a Maxwell Bros. Scholarship, a Sonoco Products Scholarship, and the CIBA junior and senior scholarships.

He plans to do graduate work at Clemson towards a master's degree in Textile Chemistry.

Recent Developments in Cotton Ginning

By Warren E. Garner, Engineer in Charge
Cotton Ginning Research Laboratory
Clemson, S. C.

The past fifteen years have witnessed many changes in the cotton ginning industry. In fact it is likely that more significant developments in ginning have occurred during this period than in all the years prior to World War II. Changes in the ginning industry have been characterized by great reduction in the number of ginning plants and by large increases in the amount of auxiliary equipment in gins. These developments have been brought about by changing economic conditions, technological advances in ginning, shifts to mechanical harvesting, and a need to process a crop whose harvesting season seems to get shorter every year.

That the ginners have kept pace with the times is evidenced by the fact that they are processing a U. S. cotton crop of about 14 million bales per year as they did years ago, but they are doing it adequately with less than one-fourth the original number of gins. At one time there were about 28,000 cotton gins in the United States. By 1956 the number had decreased to 6,836, according to reports of the USDA Agricultural Marketing Service, and in 1961 there are 5,619 total gin batteries. However, the gin of today is a far cry from its predecessor which did little more than separate the fibers from the seed. Seed cotton was brought to the gin clean and dry, therefore no other equipment was needed. The modern gin receives cotton with widely varying amounts of moisture and foreign matter in it. To handle such cotton adequately it can easily represent an investment of over $300,000, and have such auxiliary equipment as automatic seed cotton input controls, one or more seed cotton driers with automatic controls, green boll and rock traps, seed cotton cleaners of various designs, special purpose equipment such as bur machines and stick and green leaf machines, large extractor-feeder-cleaners over each gin stand, one or more lint cleaners, and packing equipment for producing bales with much greater density than the standard flat bale.

Developments in ginning have been due primarily to the efforts of the USDA Cotton Ginning Research Laboratories and the research departments of the gin machinery manufacturers. The USDA Cotton Ginning Research Laboratory at Clemson serves the Southeast, with others located at Stoneville, Miss.; Mesilla Park, New Mexico; and Chickasha, Okla. The objectives of cotton ginning research in the USDA are to discover and develop basic and applied principles useful in the cleaning of seed cotton, drying and conveying of seed cotton, the separation of lint from cotton seed, and cleaning and packaging of lint cotton. Once a principle is established the normal procedure is for the gin machinery companies to build machines according to their own design, yet embodying the principle established by research. For example, new principles of drying and cleaning seed cotton have shown up in commercial products of various design, either as complete units or as attachments to other machines. Before new machines or techniques are released to the public they must pass exhaustive tests in the laboratory and the field. The

Received BSAE and MSAE degrees from University of Georgia, Athens, Georgia; Served with Corps of Engineers, U. S. Army, 1943-1946, European Theatre; Did research on Mechanical Processing of Farm Products at College Experiment Station, University of Georgia 1946-1955; Research Agricultural Engineer at USDA Southeastern Cotton Ginning Research Laboratory since its establishment in 1955.

aim is to make more profit for the producer yet maintain the inherent properties of the cotton, thus making it attractive to the spinner. To do this the USDA Ginning Laboratories maintain their own fiber laboratories for conventional tests to evaluate ginning. They purchase additional fiber tests and spinning tests from other government agencies. The gin machinery companies also maintain fiber testing facilities and at least one company has its own spinning laboratory.

The advent of mechanical harvesting has greatly affected ginning research and the commercial development of gin machinery. The following statement from the September 2, 1961 issue of **Science News Letter** emphasized this development. "In 1960 for the first time in history more cotton was harvested by machines in the United States than by humans." As recently as 1956 only 22% of the total U. S. crop was machine picked. This rapid trend toward mechanical harvesting is not likely to be reversed. In fact, it is more likely to be accelerated. Machine harvesting and increasingly rougher hand harvesting have sorely taxed the ginner's ability to turn out a quality product. These cottons usually contain much more moisture and foreign matter than hand picked cottons and require more handling if they are to be processed through the gin at all. It is in this area that damage to quality can occur through excessive drying and cleaning. Moreover, both the ginning and spinning industries have been forced to adopt higher speeds for increased capacity and improved labor-saving techniques to reduce costs. This has been responsible for revealing quality elements in cotton that were not known before, and about which much remains to be learned.

This article seeks to call attention to recent trends in both ginning research and commercial development. It is not intended to be all-inclusive. Gin machinery manufacturing is a highly competitive business and manufacturers are continually introducing machines or equipment with innovations and catchy names.

A discussion of cotton ginning research and development can logically be divided into eight areas as follows:

1. Seed Cotton Preparation and Conditioning.
2. Gin Stands.
3. Lint Cotton Handling and Conditioning.
4. Cottonseed Handling and Conditioning.
5. Process Instrumentation.
6. Fiber Quality Measurements.
7. Materials Handling.
8. Farm Production and Ginning Practices.

Recent efforts in the field of seed cotton preparation and conditioning have been concerned with improved techniques and equipment for more efficiency in ginning, yet maintaining quality at the same time. One development in this field has been an automatic seed cotton input control to meter the seed cotton to the drying and cleaning processes. The machine, which is now available in several different designs, prevents chokage of machinery due to fast feeding rates and produces an even flow of cotton to allow more uniform drying and cleaning during ginning. Another development has been a device for removing sticks and green leaves from machine picked cotton. It has gained wide acceptance and is now available in several designs either as a separate unit or as an attachment for such conventional machines as bur extractors or extractor-feeders. Work under way in this field includes storage of seed cotton in compressed units similar to hay bales, both green boll and grass-removal devices, and a device for restoring moisture to dry seed cotton before ginning using large volumes of high humidity air. The latter is now commercially available.

Progress in gin stand development has been with an objective of increased capacity. This can be seen in gin stands with more saws and with larger saws. Although many gins are still in use with 70 or 80 saws per stand, it is quite common to find gins with 90, 100, 110, 120 or even 140 saws per stand. Whereas the 12-inch diameter saw was standard until recently, they are being replaced by saws of 16-inch or 18-inch diameter. Large increases in capacity have also been obtained by seed roll turning and agitating devices which cause the saws to be more fully loaded in the ginning process.

Machine harvesting and rough hand harvesting could not have been economically feasible without the development of the lint cleaner. It has been widely accepted and is now used in 90 percent of the gins in the United States. As with any mechanical device for handling cotton, it can cause damage if improperly used. A point of diminishing returns in cleaning is reached where further grade increases are offset by lower spinning quality. Lint cleaners are available in air-types, saw-types, unit or bulk types, and may be installed in various tandem arrangements. Experiments at the Clemson Ginning Laboratory have shown that for greatest return to producer, ginner and spinner no lint cleaning should be used for early season clean hand picked cotton, single stage for mid or late season hand picked cotton, and double stage for rough hand picked, snapped or machine picked cotton. Recent studies of basic design to improve lint cleaning equipment have included changes in saw speeds, feed plate design and combing ratios. Several leads were developed which warrant more extensive testing.

Renewed attention has been given to cottonseed handling and conditioning as reports of poor planting seed quality become more prevalent. A triple-drum drier for drying cottonseed concurrently with ginning has been developed and subjected to extensive laboratory and field testing. Experiments have shown that the viability of damp seed processed through this drier will not be affected by exposure of four minutes at a body temperature of 140° F. Work is under way on a pneumatic device for cleaning cotton seed which appears promising.

Considerable effort has been devoted to process instrumentation in the ginning industry as it moves toward complete automation. Gins are now available with push-button control panels centrally located for operating such equipment as fans, valves, gin stands, and packaging equipment. A product of research has been the system for measuring and controlling moisture concurrent with ginning. Since moisture con-

tent of the fibers when they hit the gin saws is a most important factor in preserving quality, much effort has been devoted to this system. The system is based on using electrical resistance of the fiber as an indicator of moisture content, and can use the signal obtained to direct cotton through appropriate paths for proper drying or to control the supply of fuel to the heater on the drier. One model, commercially available this year for the first time, utilizes the latter procedure. It is claimed to produce more efficient ginning by making seed cotton cleaning easier, preventing excessive drying, and preserving the length and strength properties of the fiber.

Several improvements in fiber quality measurements as affected by ginning have resulted from work at the cotton ginning laboratories. They in-

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School of Textiles,
Clemson College,
Clemson, S. C.

clude measurements of seedcoat fragments in ginned lint, rapid maturity and fineness predictions, a mechanical device for sorting fibers into length groups and improvements in the well-known array technique.

Cotton is conveyed through ginning plants by both pneumatic and mechanical devices. Both are high users of horsepower. In an effort to reduce ginning costs studies are under way to pinpoint power waste in gins. One example is in the trash handling system, which can be expected to be more troublesome in the Southeast in the future. A development to alleviate this problem is a small pipe trash handling system. Laboratory tests have shown that it can handle up to 12,000 lbs. of trash per hour with an air volume of only 600 cfm.

The foregoing are just a few of the significant developments in cotton ginning in recent years. In the future we can expect to see fewer but more elaborate plants with automated systems for preparing, conditioning, ginning and packaging our cotton crop. This crop will arrive at the gin with increasing and widely varying amounts of moisture and trash as strides continue to be made in mechanized production. It will be imperative to process it through the needed equipment only, using trained personnel, to produce the highest bale value consistent with turning out a product desirable to our spinning mills.

"RESEARCH UTILIZATION OF COTTON"

(Continued from page 7)

ory for its resilient, crimped state. There is a large potential market for such resilient cotton yarns in such end uses as socks and other stretchable apparel items. A full-scale research project, sponsored by the U. S. Department of Agriculture, is now underway at Clemson College to develop this important quality.

Warmth is important in such apparel and household products such as coats, jackets, suits, sweaters, and blankets. Improved warmth could open new markets amounting to 728 million pounds a year where cotton has a big price advantage over competing materials such as wool.

Warmth comparable to that of wool can be obtained in light-weight, high-bulk cotton fabrics. Cotton in its natural state, however, does not have the fiber resilience necessary to maintain bulk under repeated compression. A research project, aimed at improving these fiber bulking properties through chemical finishing, has been placed at Lowell Technological Institute by the U. S. Department of Agriculture.

Not every opportunity suggested by chemical finishing has resulted in a definite research plan. There are many consumer qualities yet to be fully explored in the light of the industry's present knowledge of chemical finishing techniques.

The market for luster is a good example. Because consumers associate certain types of luster with quality and attractiveness, this property is important in nearly all apparel, and in most household uses. Luster is especially desirable in such items as sport clothes, suits, shirts, blouses, dresses, lining fabrics, upholsteries, slip covers, draperies.

Luster can be imparted to cotton by a number of chemical or mechanical processes. The degree of luster attainable, however, is not sufficient to meet consumer's desires in many of the end uses mentioned above. Methods are needed to improve on this attainable luster.

Good tensile strength is important in industrial uses such as belting, hose, and tire cord and in such fabrics as tarpaulins. It is also needed in very light, sheer fabrics for clothing.

A process that could increase cotton's tensile strength by 25 to 50%, with a corresponding increase in fiber toughness, would be highly desirable. Cotton products, as a result, would be more durable, lighter in weight, and less bulky. Greater strength-to-weight ratios would improve cotton's position relative to the newer synthetic fibers in such industrial markets as conveyor belts, fire hose, tarpaulins, cordage, twine, tapes, and thread.

For cotton to have the same strength-to-weight ratio as nylon in tire cord, it would need to be about 250% stronger. However, because of such other factors as price, cotton actually would not have to be improved that much to re-enter the tire cord market.

Cotton inherently has a better balance and wider range of useful consumer qualities than any other textile fiber. Research has given cotton the means to overcome its problems and capitalize on its opportunities. New pressures will be brought to bear cotton's competitors and new qualities will be sought by consumers. The cotton industry has enough scientific talent, enough concentrated research attention, to meet these challenges with considerable optimism for the future.

Textiles as a Career

D. P. Thomson
Associate Professor of Yarn Manufacturing
Clemson College

Many of you perhaps think that you know what a textile career would be—just running machines in a mill.

But that is only one of its many sides—the textile industry is broad, it's basic. It does make cloth from raw materials, but it does a lot more—there are many kinds of cloth, from sheer nylon to coarse industrial ducks.

All the tints and hues of the rainbow are imparted to the finished product. Finishes of all types are added. The product is bleached, is made into clothes, yarn is knitted into socks and underwear.

Special fabrics to meet special needs are developed. Different fibers are blended to impart their special characteristics to the finished whole.

Today, fabrics are engineered, not just made. New fibers come into being, new and less costly methods are devised. More beautiful fabrics are still in the test tube.

To an industry that has duplicated the work of the silk worm, the wool of the sheep and developed new and unheard of fibers of its own, very few things are impossible.

Over three million workers are teamed together to accomplish this gigantic task of clothing the nation and supplying industry with its textile needs.

One of the most important steps that a young man takes is that of choosing a career. It's not easy—his whole future and happiness may depend upon how and where he makes his living. Before making the final decision for your life's work we would like for you to seriously consider a career in the textile field. This industry ranks third in the nation—80% of it in the South and about 33% in the state of South Carolina. Consider all sides of the problem. What will the pay be—not only now, but later—what chances are open for advancement—under what conditions will I work—what security do I have—where will I be able to obtain employment—near home—in the South or will I have to pull up roots and move to another part of the country. Here are some of the answers:

Textiles offer the college trained man a chance to stay in the South and grow with it. A recent survey shows that about 75% of our textile graduates—based on a 66% return—are still in Textiles. Their salaries are as high and in most cases above those of other engineering graduates after the lapse of a few years. Advancement is rapid for most graduates. This same survey shows that about 40% of our graduates held jobs from superintendent upwards, with another 20% holding jobs of equal status such as research, teaching, office, sales and staff members. The other forty percent are advancing right on the heels of the leaders, some are just out of college.

The conditions of work are among the best in any industry. There are approximately 325 plants scattered over our state mostly in the Piedmont region. The opportunity is here!

To you high school students who are still undecided on your life work, we invite you to visit our school, confer with textile leaders in your community, weigh the advantages against the disadvantages and make up your mind. The Textile Industry offers alert young men a challenge. Will YOU join us?

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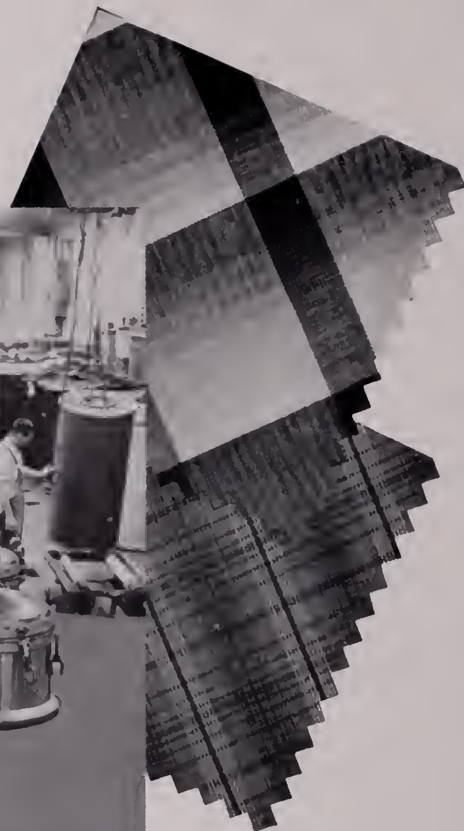
bobbin & beaker

WINTER 1961

CLEMSON



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In This Issue

THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

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from the Editor

In this issue, the staff features the popular electronic computer. Mr. A. J. Crane shows us the importance of this machine to the textile industry in his article "The Use of Electronic Computers in the Textile Industry." I am sure you will also be interested in the short course the Textile Department at Clemson provided for those men from IBM who participated. Also of interest is Mr. Thomas Keith's article on cotton production. This issue, we hope to provide a new service to our readers in the textile industry. Read page 16 and see if this applies to you.

—R. E. W

The 1961-62 Bobbin and Beaker staff seated from left to right: Crawford Love, Circulation Manager; Barry Barrineau, Managing Editor; Robert Wall, Editor; Charlie Hagood, Advertising Manager; Norman Guthrie, Business Manager.

The Use of Electronic Computers in Textile Industry

By
Mr. A. S. Crane

Mr. Andrew Jones Crane was born in Central, S. C. He attended Draughns Business College in Greenville, S. C., Walton School of Commerce, Chicago, Illinois, and the Executive Program at the University of North Carolina in Chapel Hill. His experience includes four years of Public Accounting in Greensboro, N. C., and ten years with the Springs Cotton Mills in the capacity of Internal Auditor, Director of Data Processing, and his present position as Controller of the company. Mr. Crane holds a South Carolina C. P. A. certificate. He is a member of the American Institute of C. P. A.'s Comptroller's Institute of America, American Management Association, and the Rotary Club. Mr. Crane lives in Lancaster with his wife and two children.

Any discussion of electronic computers in the Textile industry should open with this statement: No amount of high-speed data processing can supersede intelligent management in the successful operation of cotton mills and their auxiliary sales organizations.

Once this is understood, the corollary statement can be made: The high-speed electronic computer system can become the most valuable new tool in the manufacturing and marketing program of a skilled management organization.

One further generalization can be made about electronic computation and record keeping: No major textile manufacturing organization will be able to meet competition in the years ahead unless it shifts to some form of electronic data procesing.

With more than 10,000 fabrics and styles in its inventory, Springs founds it increasingly difficult to service thousands of customers. The sheer multiple of thousands by ten thousands presented an almost impossible problem in sales, inventories, supplies, and work orders.

Seven years ago the late Col. Elliott Springs realized that further expansion of the Springs organization required a faster, more flexible system of record and data processing. The various electronic computer systems were investigated and finally the International Business Machines Corporation was chosen to tackle the job.

Programming Springs' statistics and problems began in 1954. It was no easy task. The language of the electronic computer required a breakdown of all essential information into yes-no fragments, almost childish in form. At the same time, those of us in training were taught to appreciate that only this reduction of information to basic plus or minus factors would have any meaning to the computer.

There was an overwhelming logic to such a process. We were compelled to face the simple 2-plus-2 realities of complex problems and even before the first computer, an IBM 705, was ordered those of us in accounting and auditing had acquired a new concept of record keeping.

The 705 was never delivered. In the year and a half allowed for training and preparation the IBM 650 was developed and sent to Springs as a system capable of handling our organization's problems for the next five years. The 650 ran out of time in four years. Even though it was operated 24 hours a day, seven day a week, it could not keep up with the programs developed for electronic processing.

In November 1960, the IBM 7070 was delivered to Springs with the understanding that the high-speed 1401 printing and processing auxiliary would be added as soon as it became available. When this was delivered in July 1961, it took over much of the load of mechanical reproduction, releasing the overburdened 7070 for more work in the higher sphere of market analysis, forecasting trends and servicing customers' accounts.

It is in this field that the Springs organization feels the highly developed and integrated computer system will fulfill its brightest promise. It can run a complicated inventory in a matter of minutes. It can handle a weekly payroll for 12,000 employees, making all adjustments for hours, wages, and deductions and printing the checks, in less than two hours.

But these are only the pedestrian advantages of the high-speed computer. It can store an unlimited amount of market information. It can correlate this information with current trends and can come up with a digest or any specific analysis of it on short notice. It does no thinking for management but it arms management with fast, complete information on which decisions must be based.

The 7070 has almost unlimited possibilities in both practical and theoretical applications. It can service all customer accounts, advising them of market trends and spotting deficiencies in their inventories. It can accept an order for 10,000 sheets, calculate the amount and type of raw cotton needed, notify the cotton purchasing agent, transmit the work order, send shipping instructions to warehouse, order the labels and packing materials, and make a thorough inspection of the customer's account and credit rating in a matter of minutes.

It can do this thousands of times a day and handle its jobs, if the proper information has been prepared for it. This preparation of programs for electronic processing is what separates major users of the system from the boys. It required two years to get ready for a computer installation. It required five years of experience to realize the full benefits of the advanced systems now available.

Perhaps five years is not long enough. Here at Springs we are doing things with the computer which were beyond our conception last year. New uses for it are constantly being planned.

The Dean Says

This Fall we had an interesting short course in the School of Textiles. IBM looked around and found itself with a group of salesmen calling on the textile industry who knew nothing about the language, processes or problems of the textile industry. They came to us to see what could be done to change the situation.

Working together we organized a three week short course to give a concentrated program in textile manufacturing and management. The program started with raw materials and went straight thru the manufacturing processes, including dyeing and finishing.

Then the subjects of quality control, methods and standards, costing and testing were taken up as separate items.

Different members of the faculty put on the part of the program that fell in their specialty with Professor Campbell having general supervision of the whole program.

Each Thursday night IBM entertained at a dinner at the Clemson House for the members of the class, some IBM visitors and participating faculty and their wives. Mr. Charlie Gibson of B. I. Cotton Mills spoke at one dinner, Mr. Cecil Browning of Greenwood Mills spoke at one and President Edwards spoke at the last dinner.

The group was taken on tours of Lowenstein Cotton and Storage, J. P. Stevens' Utica Mohawk Plant, Lyman Bleachery, Deering Milliken Research, Rocky River Mills of Bigelow, Sanford Carpet Co. and the Gerrish Milliken plant. These tours gave the group a close look at a wide range of textile operations.

There were eighteen in the class. We think it was a great success, beneficial not only to IBM but to Clemson and the School of Textiles. I know that we in the Textile School have a better appreciation and understanding of computers than was the case before this class.

Outstanding Seniors . . .

By: Steven D. Tucker

Robert Eugene Wall is a Textile Science major from Charleston Heights, South Carolina. He is 21 years old. Bob has received an Albany Felt Company scholarship to help finance his expenses at Clemson.

Upon graduation Bob will receive a commission in the U. S. Army Reserve, and after completing his active duty, he would like to work in the production end of the textile industry.

At Clemson Bob is Editor of the "Bobbin and Beaker"; **Kappa Delta Chi** Historian; Vice President of N.T.M.S.; Chairman of the Council of Club Presidents; and Hall Counselors of C-8. In the Student Government he is Secretary of High Court, a member in the State Student Legislature, and a member of the President's Committee. Bob is also a member of Blue Key, and he is listed in "Who's Who in American Colleges and Universities." During his Junior year, Bob was Managing Editor of the "Bobbin and Beaker."

Norman C. Guthrie, Jr., age 21, is a Textile Science major from Charlotte, North Carolina. Norman received honors during the first semester of his Freshman year and the second semesters of his Sophomore and Junior years. He is also the recipient of the Springs Foundation Scholarship. In the textile industry, Norman has worked in plant work and sales with Textile Fibre and Manufacturing Company for one summer, and in sales with P. F. Collier and Son Corporation for one summer. His job preference after graduation is in the production end of the textile industry.

Norman is a Senior Class Senator at Clemson; president of **Kappa Mu Kappa**; and Business Manager of the "Bobbin and Beaker." In addition, he is also a member of Blue Key and **Phi Psi**, and he is the Hall Counselor of A-8. Norman served as Personnel Director of "Tigerama", and he is listed in "Who's Who in American Colleges and Universities."

Thomas Wyatt Templeton, age 22, is a married student from Greenwood, S. C. Thomas is majoring in Textile Chemistry. He received honors during the first semester of his Freshman year, and also in the first semester of his Senior year. To aid with his college expenses, Thomas received the Charles H. Stone Scholarship during his Junior year, and he is the recipient of the South Carolina Textile Manufacturers Scholarship this year.

In the textile industry, Thomas has worked on a special project with Abbeville Mills during the summer. His job preference after graduation is to work in some phase of production or research in the textile industry.

At Clemson, Thomas is a Distinguished Military Student. He is also Treasurer of **Phi Psi**. During his Junior year, he was Treasurer of A.A.T.C.C.

I.B.M. PARTICIPATES IN 3-WEEK COURSE

Forest Dixon, Jr., T.C. '63

This fall textile students at Clemson witnessed an innovation in industry's attempts to keep up with the fast moving pace of today's textile world. Twenty-one sales representatives of the International Business Machines Company participated in an intensive three week course in textiles conducted by the faculty of the Clemson College School of Textiles. The salesmen spent most of their class time on courses pertaining to textile management and textile manufacturing processes. Also included in the three week course were several tours through textile plants in the immediate Clemson area.

The Clemson course is the first textile school to be held under IBM's advanced sales program. The Clemson program met with immediate success and the undoubted sales increase in IBM Computers to the textile industry will also show the benefits of the course to the IBM company and the textile industry. Similar schools have been conducted for salesmen who specialize in banking, insurance, retailing, manufacturing, transportation, and local government. Other schools of this same kind have been conducted by other departments here at Clemson for various companies since 1957. Richard C. Warren, IBM Eastern Regional Manager, described the course as "an opportunity to provide our textile industry specialists with training that will enable them to apply a completely professional approach to the processing needs of textile companies. Members of the class. who originally joined the IBM sales force with at least a bachelor's degree and have an average of five years experience with the company, were selected for the course from IBM's offices from Atlanta to Montreal. The salesmen who participated in the course will be dealing directly with textile companies in the area near their respective offices.

The program consisted of more than seventy hours of classroom and laboratory instruction by the faculty of the School of Textiles and six industrial tours of cotton, synthetic and woolen mills, finishing plants and cotton warehousing firms. Professor T. A. Campbell, Jr., head of the Textile Management Department of the School of Textiles, headed the staff of Clemson professors who conducted the IBM school. Professor Campbell, who has done much work in costing for the textile industry, was highly complimentary in his praise towards the IBM Company for this "step forward" in relation with the textile industry. Of the total of fifteen class days four were spent solely on textile manufacturing processes, three and one-half were spent on textile management problems and the remainder of the three week course was spent on plant tours and a short course in fabric finishing. The greatest emphasis was placed on some of newer processes of the textile industry, since most of the salesmen have been away from any formal education for five years or longer. The basics of textile processing were made familiar to all the class members so that in their dealings with the textile industry they would be familiar with any situation which any particular company had at the time.

The main objective of the IBM school here at Clemson was to produce a salesman, who could go into a textile plant and understand not only the problems facing the manufacturer but also, the terms and processes used by the personnel of the particular company. During the course here at Clemson the personnel of the IBM Company were briefly exposed to every facet of a modern textile company's operation. The salesmen learned how to operate some of the basic machinery in a textile plant, so that they would be better qualified to deal with today's textile

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Cotton Production

By
Thomas Keith

Editor's Note — Cutting costs and improving quality in production eventually have a big effect on mills and their operations because this progress is inevitably reflected in two ways — a better fiber for mills to spin at a more competitive price. When something is done to improve the welfare of the cotton industry, the welfare of everyone who has a stake in cotton is improved. Recognizing this fact, the following article is published.

Thomas Keith graduated from Texas in 1959 with a B. S. in Agricultural Journalism. After serving six months at Fort Jackson he became Technical Editor in Production and Marketing Division for the National Cotton of America.

Progress in almost any field is difficult to measure on a year-to-year basis. This is particularly true of cotton production—progress toward greater production efficiency and toward improving and preserving the quality of the cotton fiber. This is true because of year-to-year variations in weather, insects, etc., which can produce sharp changes in yields, costs and quality.

To get a true picture of progress made in cotton production it's necessary to look at a period of years —to look at where we were in terms of yields, costs and the like years ago as compared with now.

Much of our progress in cotton production and marketing has come since World War II. At that time cotton production methods still depended heavily on the use of animal power and relatively unskilled human effort. Let's look at some of this progress and the impact it has had upon the cotton industry.

MECHANIZATION IS MOST DRAMATIC CHANGE

The most dramatic development since the end of World War II has been the substitution of horsepower for the horse, or mule — a development we call mechanization. The leader in this substitution was the growth in the use of tractors. Much of the progress has been tied to and dependent upon this transition.

Presently, it is estimated that on a Beltwide basis something like 99 percent of the land preparation and planting of cotton is accomplished with tractor drawn machines. More than half of the crop now is mechanically harvested—and this gets us into a more recent development that also has had a far-reaching impact upon cotton production.

The big transition to machine picking has been accomplished in a relatively few years. Mechanical harvesters had hardly made an appearance on the cotton production scene at the end of World War II. Even as late as 1950 less than five percent of the total U. S. Crop was harvested mechanically.

There have been several reasons for this phenomenal growth, but the biggest has been the changing farm labor situation. Fewer and fewer workers have been available—and what labor has been available has become so expensive that it has become necessary to start looking for an alternative. Machines have provided that alternative.

A practice that has gone hand in hand with mechanical harvesting is defoliation. Early in the life of machine pickers it became apparent that a better job could be done if leaves were removed from the cotton plant. Removing the leaves lets in air and sunlight, which retards deterioration of seed and fiber and reduces boll rot. Dew is dried faster, which means more safe picking time—when the moisture content of the cotton is below 10 percent. The end results are reduced trash and moisture content of machine-picked cotton and increased picking efficiency.

While defoliation has gained wide acceptance as an aid to mechanical harvesting, methods to assure success year after year have not been developed. We still need better answers for a lot of questions: how to get complete leaf drop; when is the best time to defoliate to prevent yield reduction; what plant and environmental conditions are best for good result; how to prevent regrowth, and others. Researchers are now working on this important practice.

INSECTS STILL TAKE BIG TOLL

Let's leave machines now and look at another vital area of cotton production—insect control. It's hard to actually pin down progress here. We have improved insecticides—and more are being used than ever before. But insects continue to take an enormous toll. The boll weevil alone still costs producers about $340 million annually.

One explanation for this paradox is that many growers still take their chances with insects and don't practice control. At the same time, our insect problems continue to get more complex. There is a greater number of insects to contend with, which means producers who don't practice control suffer even heavier losses than before. Every cotton-pro-

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ducing state now has practical, workable insect control recommendations and there is a definite need for educational work to get these recommendations into use.

Meanwhile, researchers are busy turning up new leads on how to better control insects. Since it is presently the most destructive pest and rates top economic priority, the boll weevil is receiving the lion's share of attention. The million dollar cotton insect laboratory being constructed by the U. S. Department of Agriculture at State College, Miss., will concentrate on the boll weevil at first, but will later devote effort to other insects.

One of the latest and most promising developments in boll weevil control is designed to strike the pest as it prepares for hibernation. Recent research has shown that in the fall about 40 to 50 percent of all weevils enter "diapause," a physiological stage in which they accumulate fat reserves and cease reproductive activity. Only those weevils entering diapause survive the winter.

In field tests in Texas in 1959, application of insecticides during this critical period in the life of the weevil resulted in almost complete eradication. To determine if this method can be developed for routine control, or a possible means of eradication, more extensive tests are now being conducted under widely varying climatic conditions and different degrees of isolation.

Cotton insects will undoubtedly be with us for a long time to come, but there are good possibilities for improving control measures and greatly reducing the toll they take out of farmer's profits.

BIG STRIDES BEING MADE AGAINST WEEDS

Weed control is another big cost item which adds about four cents a pound to the cost of producing cotton, in addition to indirect losses in yield and quality. Lack of effective, dependable control methods also prevents full application of other cost-reducing practices such as mechanization, fertilization and irrigation.

This is an area where we've definitely made some big strides the last few years. We've seen improvements in mechanical control methods—flame cultivation, rotary hoes, etc. But the biggest and most promising development is in the use of chemical control. We're now getting some pretty good chemicals to control weeds in cotton—if they're used properly. Most of the herbicides available at present afford a small margin of error in that they can harm cotton and no one chemical will complete control. Most of them are rather specialized and will control only certain weeds.

There has been a step-up in research in this area. Studies are being conducted in an effort to develop economical chemicals that will give season-long control of all grasses and weeds which infest cotton fields across the Belt without harming cotton or leaving harmful residues. While much of this research is still in its infancy, there are already indications that through continued effort it should be entirely possible to tailor herbicides to specific weed-cotton situations.

Fertilization is another big key in the higher yields of today. And fertilizing for higher yield also cuts expenses, because planting, cultivating, dusting or spraying, and controlling weeds for a bale per acre costs only about as much as for a half bale per acre.

PROPER BALANCE GIVES BIGGEST PROFITS

It should be emphasized that efficient cotton production is dependent upon a proper balance of all improved production practices and no one alone will get the job done. This is borne out by results of the Five-Acre Cotton Improvement contest conducted for a number of year by the South Carolina Extension Service.

In 1957, 764 contestants furnished complete records of yields, costs and returns. These records were analyzed and divided into five groups according to average per acre yields. Two of these groups particularly show an interesting comparison.

Seventy-eight of the farmers averaged a little more than one-half bale per acre, and 82 averaged a little more than two bales. Most of the other (596) fell between these two extremes. The most significant differences in costs were for fertilizer and insect control. Other costs were rather uniform.

The half bale group used about minimum requirements for a balanced fertilizer and an average of four insecticide applications. The net profit to the farmer was $22 per acre.

The two-bale group used about 60 percent more fertilizer and an average of seven applications of insecticides. The net profit to this group was $240 per acre.

One other comparison was highly significant. The half-bale group produced cotton at an average cost of 31 cents per pound. The two-bale group reported costs which averaged less than 16 cents per pound. This further confirms importance of achieving a proper balance of improved production practices.

OVER-ALL QUALITY IMPROVED

This discussion would be incomplete without mentioning quality. Geneticists have given cotton a better inherent quality and all in all a good job is being done in preserving that quality in all phases of production, handling and ginning. However, there have been notable exceptions the last few years and the industry is devoting a concerted effort to eliminating these exceptions. Just as a rotten apple in a barrel affects the entire barrel, a few bad bales affects the entire industry.

This is not to underemphasize some of our quality problems. We need to know more about the effects of various production and ginning practices on quality—how these practices ultimately influence cotton's spinning and end-use performances—and how we can measure quality and predict its value in all stages of marketing. Modern mills need better quality, and cotton's competition is such that this better quality must be provided.

Again, research is the answer—and again researchers are hard at work to give us these needed answers.

YIELDS, LABOR REQUIRED TELL STORY

What has all of this progress meant to the industry?

The best indicators are yield and man-hours required per bale—and these pretty well tell the story. At the end of World War II we were producing 253 pounds of lint per acre and using over 300 hours of labor to do it. In 1960 we produced 442 pounds of lint per acre with about 65 hours of labor.

Certainly an impressive record of accomplishment —and a real challenge for the future. The present cost-price squeeze in no way suggests the industry

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can rest on its laurels. The very items that represent the industry's biggest problems in the area of costs and losses also present the biggest opportunities for greater gains in the future.

It behooves the industry to capitalize on these opportunities and continue the encouraging trends of the past.

A. A. T. C. C. CLUB

By

Jerry Byrd, TC, 1962, Secretary

The Clemson College Textile Chemistry Club made a field trip to the Utica Mohawk plant on October 24, 1961. The members enjoyed the tour and learned a great deal about the finishing of cloth.

A supper for the members of the T. C. Club has been planned for the 12th of December. The supper is to be held at "Dan's" and all T. C. majors are urged to join the club and attend the supper.

Since there is such a small number of members in the T. C. Club, it has been decided to meet only once a month instead of twice as in the past.

IBM PARTICIPATES (Continued from page 10)

market. One of the main problems which had faced IBM salesmen in their dealings with the textile industry before the course was conducted here at Clemson was their lack of complete understanding of the needs of the textile industry with respect or data processing machines. Now, that the IBM salesmen knows how the industry wants and needs to use data processing machines his sales should increase because he can recommend to his customer an exact machine to meet the immediate and future needs of a particular company.

The success of this type of back-to-college training for sales-people is most apparent and other companies who deal with the textile industry should explore the possibilities of this sort of school for their sales force. The greatest advantage to be gained from this school is the ability of the salesmen to be able to comprehend the individuality of the textile industry and to deal with any kind of problem which might arise pertaining to their particular product. When a salesman knows what a customer wants he can surely come closer to selling him something which will please both the customer and the salesman; but when the two parties concerned cannot understand each other it is very hard to make a sale.

N.T.M.S. Keeps Pace With Time

By
John W. Mathis, Secretary, TM '62
Assisted by Donald L. Langley, Treasurer, TM '63

Since its organization in 1951, The National Textile Manufacturing Society has grown through the years and has become one of the prominent professional organizations on the campus. The purpose of the organization has been to bring about a more intimate relationship between the textile industry and the undergraduates of the textile school.

This year the N.T.M.S. has shown its popularity by surpassing all previous records of growth. The club experienced a threefold increase in membership. With this increase in membership there has been an increasing number of field trips, movies, and guest speakers. These field trips, movies, and guest speakers give the members a chance to see all phases of the textile industry. It acquaints the student with some of the problems and solutions of the industries.

The latest activities include a field trip to a narrow fabrics plant in Greenville, South Carolina; a speech by the Dean of the School of Textiles; and a movie on quality control.

With the coming year to look forward to, the N.T.M.S. is keeping pace with time. In order to perpetuate an ever evolving goal of perfection, the N.T.M.S. recently reached a decision which should have far-reaching effects on the prestige and value of the organization. The members voted to become affiliated with the American Association for Textile Technology and to discard the name of N.T.M.S. Henceforth, the club will be known as A.A.T.T.

The decision to become affiliated with the American Association for Textile Technology came after several months of debate and correspondence between the two groups.

The American Association for Textile Technology has been a senior organization for some forty years and is now in the process of organizing Student chapters throughout the vast area blanketed by the textile industry. The decision to change to the national organization will enable Clemson textile students to become charter members of the student division of one of the larger professional organizations of Textile Technologists in the country.

As the members of the now defunct N.T.M.S. look back over the ten years of existence as a local club, they can be proud of its many accomplishments and honors. Present day members can also look forward to launching the A.A.T.T. as a new and valuable organization which will serve the textile student and the textile industry for many years to come.

Editor's Note: The information contained on this page is something that we, the Staff of the **Bobbin and Beaker**, hope to be a continuous service. Realizing that this magazine is widely read throughout the textile industry, we hope that this will be of service to some of our readers. As you can readily see, these are prospective jobs for those college graduates who already have some textile experience. Apply to the persons listed below or call area code 803, 654-2421, (ext. 241) for further information. The staff wishes to extend thanks to Mr. Greg Hughes of the Clemson Placement Office for this information.

Job Openings

R. B. Lineks, Personnel Department, Burlington Industries Inc., Greensboro, N. C.; (1) ME, with related experience, for humidity and refrigerator design in Central Engineer Department; (2) Draftsman, prefer architecture background, for assignment in engineering office, $500-600.

Ed Gould, Area Personnel Executive, Burlington Industries Inc., Pacific Mills Division, Halifax, Va.: Opening for 2 EE or ME graduates, plant engineering assignments in North Carolina or Virginia, $525-575.

L. W. Mott, Personnel Manager, Coates and Clark Inc., Albany, Georgia: Textile graduate, or equal background, to start on management training program—about 1,000 employees.

G. E. Wall, Personnel Director, Calloway Mills Co., LaGrange, Ga.: Immediate openings for Chemistry graduates in (1) customer liaison with plant and new latex develpopments of applications and treatments; (2) project work in Research Department on wet finishing and painting, evolution of chemicals, etc.—prefer no military obligations.

J. C. Spangler, Director of Employment, Dan River Mills, Danville, Virginia: Shift Overseers or Second Hands in Carding, Spinning and Weaving, prefer 3 years experience—promote to Department Overseers, good salary and pay moving expenses.

R. R. Miller, President, Dixon Corporation, Monroe, North Carolina: Textile graduate, with spinning and roving experience, also engineering or supervisory background—manufacturing spinning change overs for textile industry.

E. O. Ericker, Manager, Kroehler Manufacturing Company, Naperville, Illinois: Opening for Administrative Assistant, age 30-36, Textile background helpful—learn business operations of leading furniture manufacturers, excellent salary and opportunity.

C. E. Ernest, Employment Supervisor, Wallerstein Co.—Division of Baxter Laboratory Inc., Mariners Harbor, Staten Island 3, New York: Textile Chemistry or Chemistry graduate with industrial experience, for technical sales and trouble shooting with Textile and Paper Department—considerable travel required, offers good salary and benefits program, one opening for Technical Sales in Southern states to textile and paper industries.

W. S. Gault, Recruitment Manager, American Viscose Corporation, 1617 Penn. Blvd., Philadelphia 3, Pennsylvania: (1) 13 openings of Chemistry, Ch En, EE, ME, and others, 0-5 years experience, in research, development, engineering, technical and sales departments at 6 locations—new products and processes offer challenging opportunities; (2) Textile graduate, or equal background, for Sales Trainee in textile fibers division.

J. L. Kennedy, Manager of Personnel, Johnson & Johnson, 4949 West 65th Street, Chicago 38, Illinois: ME or Textile graduate, 0-5 years of experience, project engineering assignment in Cotton Processing area, start salary to $823.

R. S. Barnes, Plant Manager, Rhymhouse Manufacturing Company, Box 444, Cherryville, North Carolina: Textile graduate, strong combed experience, for Overseer of Carding—excellent future with BI plant.

Alumni News - - -

Class of 1940

Anderson, C. E., from Union, S. C. Mr. Anderson is at present plant manager of Excelsion Mill in Union.

Cobb, Charles D., a textile major from Trion, Georgia. Mr. Cobb is working in Columbia, South America, as Plant Superintendent of Celanese Colombiana.

Ferguson, Thomas Dale, a textile major from Abbeville, S. C. Mr. Ferguson is now Superintendent of Weave Mill for Abbeville Mills Corp.

Class of 1942

Abbott, Wallace White, from Morristown, Tennessee. At present Mr. Abbott is now serving American Enka Corp. as Technical Supervisor of Textile Dept., in Lowland, Tennessee.

Berry, Robert Sayre, Jr., lives in Cornelia, Georgia. Mr. Berry is employed by Chicopee Manufacturing Corporation and is Plant Superintendent in Cornelia.

Filmore, William C., a textile major from Abbeville, S. C. Mr. Filmore is now Product Manager of Sales Yarn for Abbeville Mills Corporation.

Godfrey, James H., a textile major from High Shoals, N. C., serving as Superintendent for Carolinan Mills. Mr. Godfrey is employed by Burlington Industries.

Class of 1944

Adams, Allen T., from LaGrange, Georgia. Mr. Adams is now Plant Engineer for Calloway Mills in LaGrange.

Boyce, Jesse A., a textile major from Durham, N. C. Employed by Erwin Mills, Inc. Mr. Boyce is now Assistant Manager of Durham Division in Durham.

Chandler, Ray E., from Spartanburg, S. C. Mr. Chandler is now Yarn Development Coordinator in the Createx Plant of Deering Milliken, Spartanburg.

Holt, Ernest E., a textile major from Kingsport, Tennessee. Employed by Tennessee Eastman Company. Mr. Holt is now Manager of Production Planning for Fiber Divisions.

Jolley, Joseph Douglas, a textile major from St. Paul, N. C. As General Overseer of Carding, Mr. Jolley is employed by Burlington Industries in the Robeson Plant in St. Pauls, N. C.

Class of 1946

Ballenger, Gerald, a textile major from Wellford, S. C. He is presently Manager of Industrial Engineering Dept. of Jackson Mills in Wellford.

Pinson, Marvin J., a textile major from Raeford, N. C. Mr. Pinson is now Superintendent of Raeford Plant, Burlington Industries.

Wood, Allen K., a textile major from Kingston, N. C. Mr. Wood is now Supervisor of Process Control in Kingston Dacron Plant, E. I. Du Pont.

Class of 1948

Buchanan, Lawrence H., a textile major from Greensboro, N. C. Mr. Buchanan is presently employed by J. P. Stevens & Co., Inc. as Assistant Yarn Sales Manager in Greensboro.

Burns, Leland E., a textile major from Great Falls, S. C. Serving as Manager of Republic Plants 1, 2 and 3. Mr. Burns is employed by Republic Cotton Mills.

Calvert, Robert Lewis, a textile major from Louisville, Kentucky. Mr. Calvert is presently Assistant Superintendent for Louisville Textiles Inc.

Carlton, Calvin C., a textile major from Gastonia, N. C. Mr. Carlton is at present Assistant Manager of Gastonia Yarn Plant, United States Rubber Co.

Class of 1949

Kelly, Z. K., a textile management from Pelzer, S. C. Since graduation Mr. Kelley has been an Overseer in the Spinning Department for Limestone Manufacturing Company in Gaffney, S. C. He is at present Assistant Superintendent of Henderson Cotton Mills in Henderson, N. C.

Cameron, Frank B., a textile major from Lavale, Md. Mr. Cameron is now Production Manager of Amcelle Plant for Celanese Corp.

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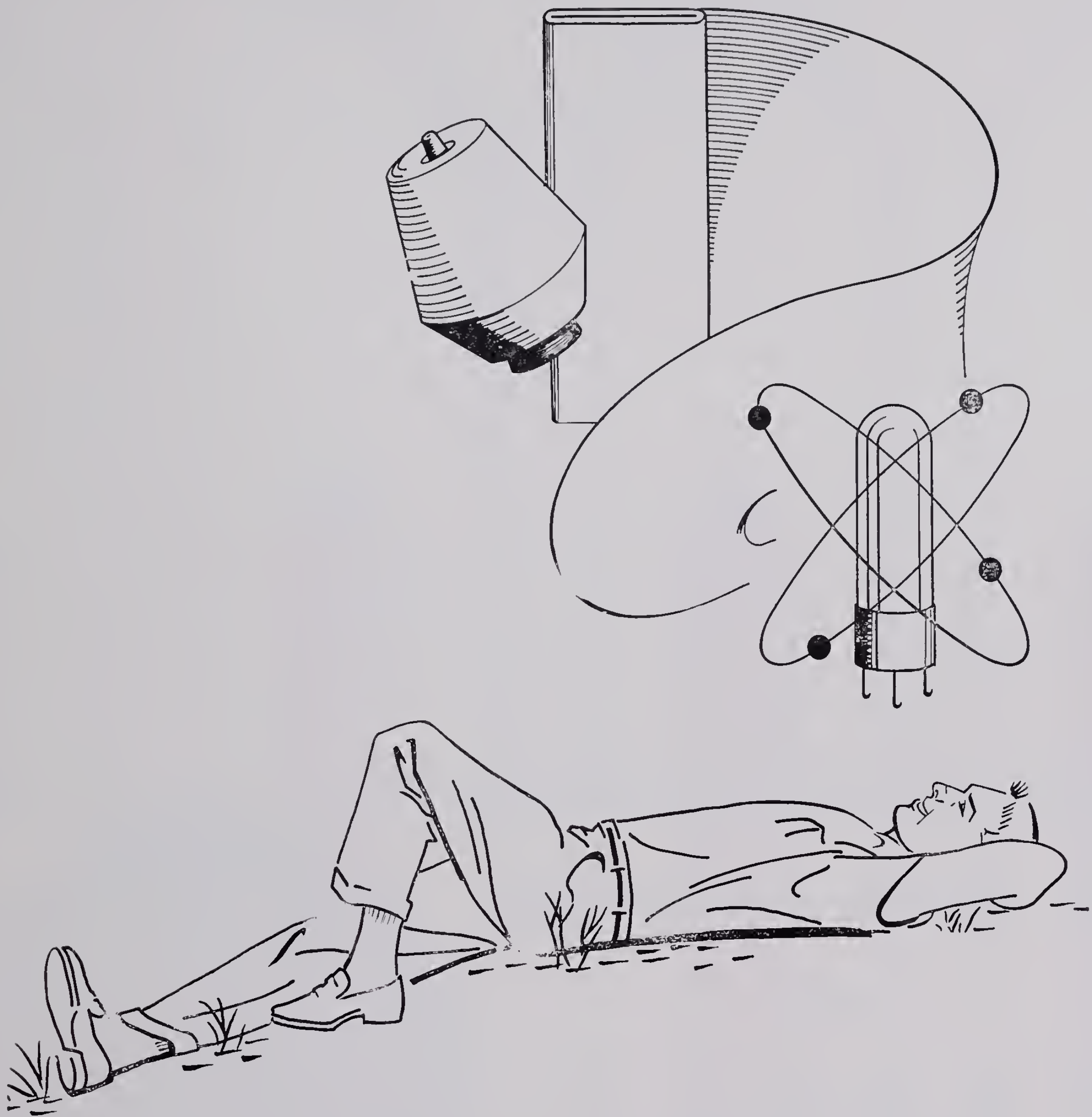

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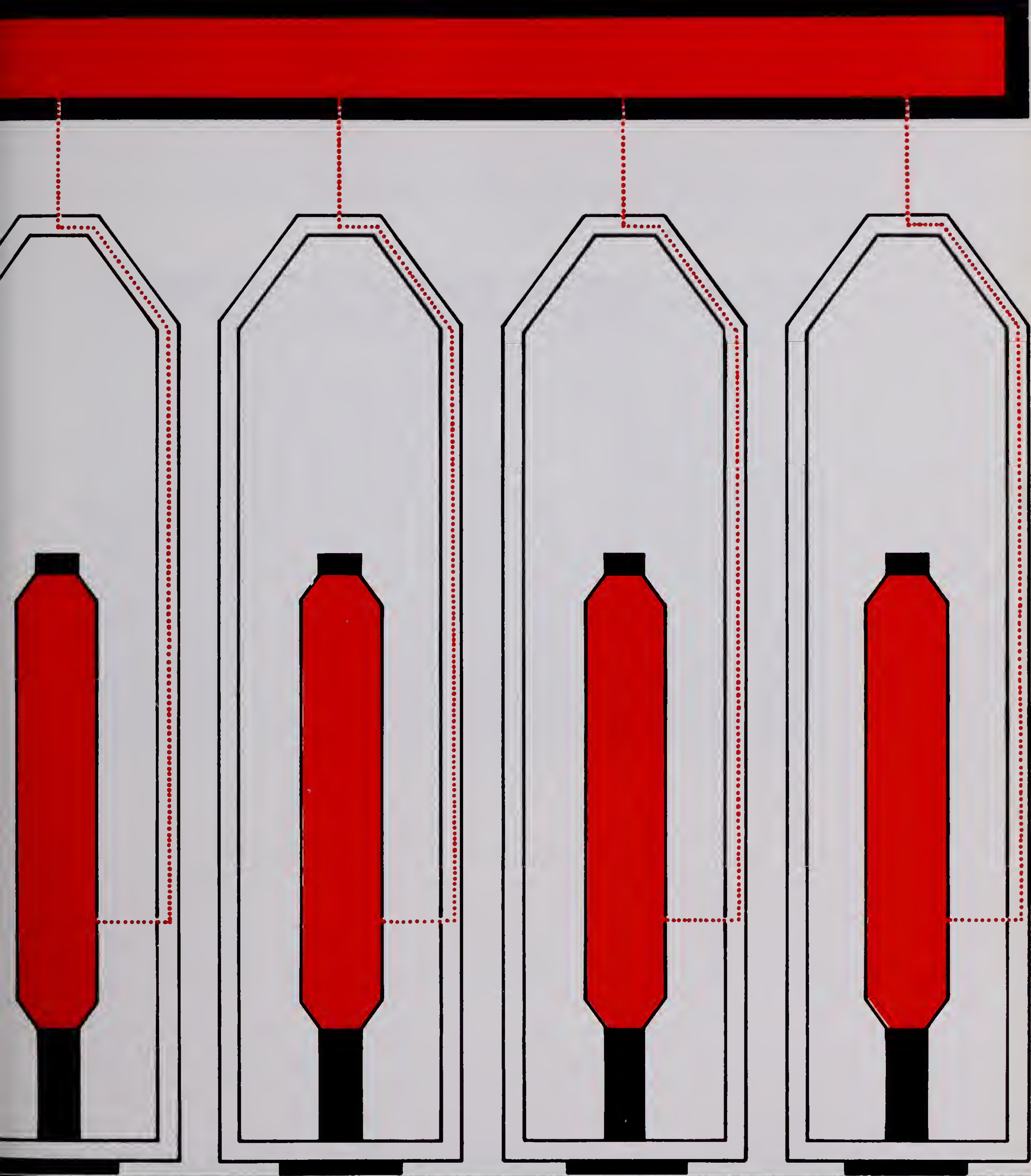

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THE

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NEOZYME® HT — Concentrated high temperature desizing enzyme. Removes both starch and gelatine. Suitable for continuous pad-stream method. Remarkable stability at very high temperatures.

NEOWET X — Effective wetting agent at all temperatures from cold to boiling. Does not inhibit enzyme action in desizing bath. Good for use with resin finishes, and hydrogen peroxide bleaching liquors. Good rewetting properties. Anionic.

P.S. . . . A centrally located plant . . . strategically placed warehouses . . . and Royce's own fleet of trucks . . . mean fast, dependable delivery—always!

NEOZYME® L & NEOZYME Special —Liquid desizing enzymes in two degrees of concentration. Remarkable stability at very high temperatures.

VELVO SOFTENER #25 — Economical creamy white paste softener derived from highly sulphonated tallows. Gives softness and body without stiffness or offecting whites.

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Manufacturers of Chemicals for the Textile Industry

from the Editor

This, the last issue by the Senior Staff, features two of the latest developments in the Textile Industries—Saco-Lowell's new Duo-Card and Rovematic. Thanks are extended to Saco-Lowell in Easley, S. C., for this very interesting information.

We, the Senior Staff, have attempted to give something of interest to all of our readers, students, faculty, and textile management.

I want to thank all of our advertisers, who make this publication possible. The Junior Staff will now take over the magazine for the next four publications.

—R. E. W.

The 1961-1962 Bobbin and Beaker staff seated from left to right: Crawford Love, Circulation Manager; Barry Barrineau, Managing Editor; Robert Wall, Editor; Charlie Hagood, Advertising Manager; Norman Guthrie, Business Manager.

The DuoCard, A New Concept In Carding

A new concept in carding has been introduced to the textile industry by Swift Spinning Mills, Inc., of Columbus, Georgia.

Designed to broaden the potential of the card through increased production, improved quality and waste reduction, the DuoCard was designed and developed by Otis B. Alston, General Superintendent of the Swift Mills.

The DuoCard is two carding machines coupled together, and cotton is run through two cards rather than one. Millmen regard the DuoCard as the only major advancement in carding in nearly a century. W. Frank Lowell, Sr., President of Saco-Lowell, called the DuoCard "the answer to a problem on which the textile industry and machinery manufacturers have been working for years."

In the DuoCard system, two conventional cards are altered by removing the front delivery section of one card back to the doffer. The licker-in on the second card is replaced by a doffer which provides continuous high speed transfer of the carded fibers to the second cylinder. A finished carding action is given the fibers before they are placed in sliver form. The DuoCard system can be installed on any type card, and mills can adapt present cards to the system.

Seventy-five DuoCards have been operating in Swift's Columbus plant for the past six months with production in some cases tripled, and the quality of the yarn improved. Fibers passes through cards are normally oval-shaped in cross-sections. However, fibers passed through the DuoCard have been found to be more nearly round and to make brighter fabrics.

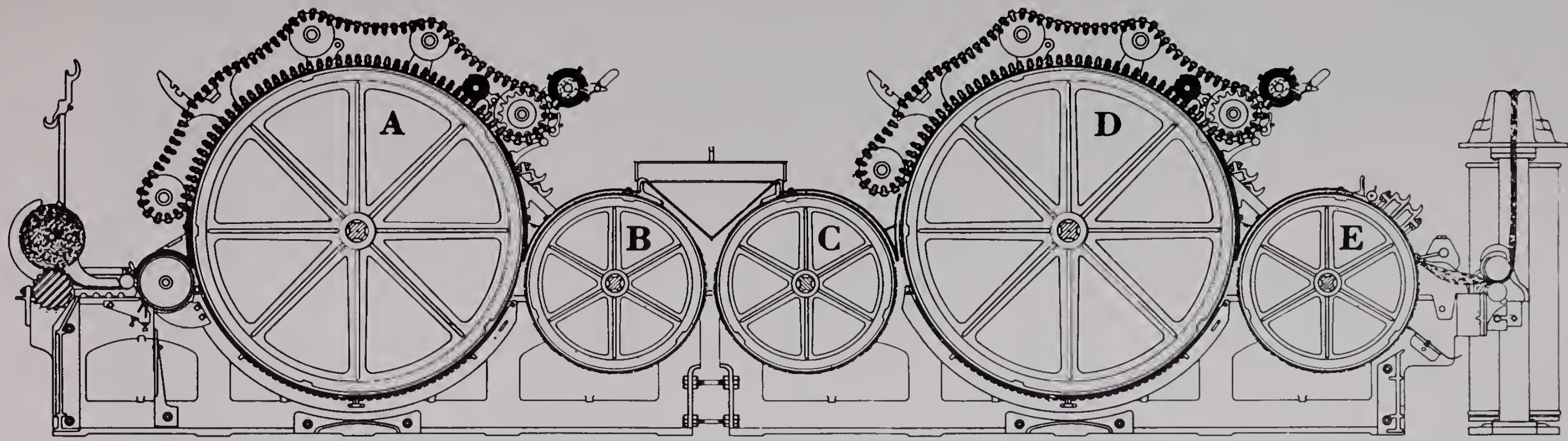
Improvements in carding noted during the DuoCard operation include, an increase in production, a saving in floor space, and an improvement in quality. At Swift production has ben tripled. However, the increase in production will vary from mill to mill, depending on the results desired. Quality improvement can be accomplished with the same grade of cotton normally in use, or by using lower grade cotton. There is a definite decrease in neps in all grades, and the remaining neps are found to be less bulky. There has also been a decrease in time needed to strip cards. Cards are set at very close tolerances, and stripping has been practically eliminated. Metallic card clothing makes the DuoCard possible.

The problems of machine-picked cotton and overginning will be greatly helped by the new system. The process whitens or brightens fibers, operations clearly indicated.

The fibers from the first card are transferred to the second cylinder in an open and loose state with practically no damage. The transfer is from the heel of the wire to the point in all positions. The card acts as an evener and blender and consequently can be more positive in waste and nep removal.

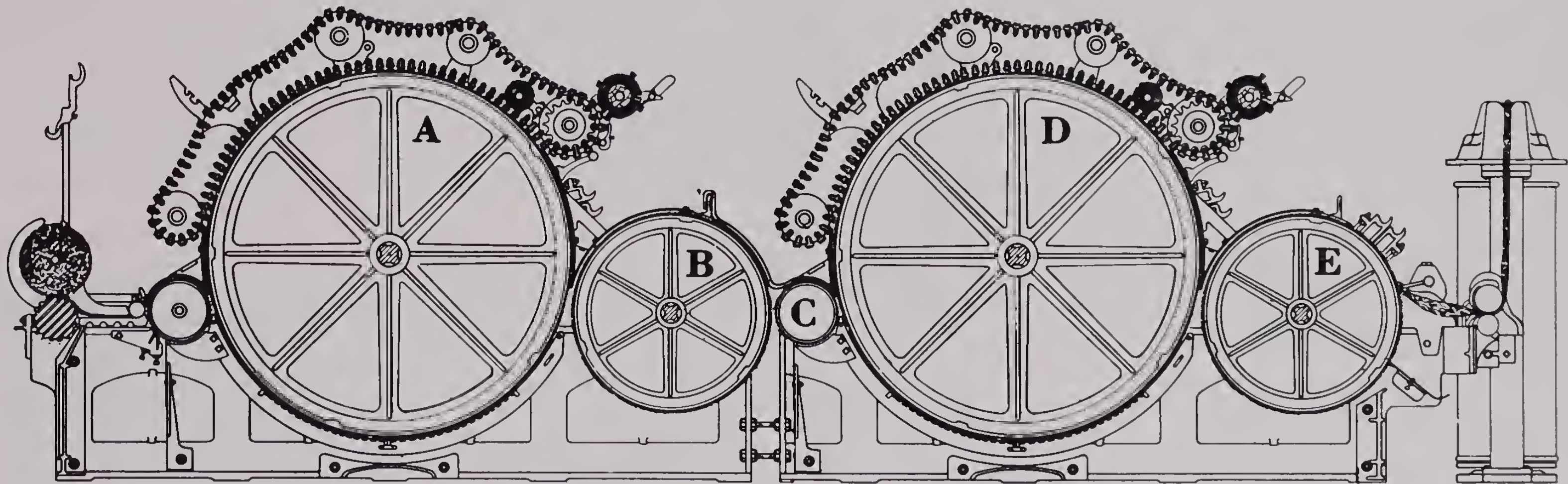
(Continued on page 16)

Saco-Lowell DuoCards



DuoCard - Using Transfer Cylinders of Same Diameter - PATENT APPLIED FOR
With Doffer-to-Doffer and with 18" Coiler, Overall Length = 19'-10"

A - Breaker Carding Cylinder
B - First Transfer Cylinder
C - Second Transfer Cylinder
D - Finisher Carding Cylinder
E - Doffer



DuoCard - Using Transfer Cylinders of Different Diameters, i.e. Doffer to Lickerin - PATENT APPLIED FOR
With Doffer-to-Lickerin and with 18" Coiler, Overall Length = 18'-3"

A - Breaker Carding Cylinder
B - First Transfer Cylinder
C - Second Transfer Cylinder
D - Finisher Carding Cylinder
E - Doffer

The Dean Says

We are now planning for our Summer Short Courses. This will be the fifth summer that we have offered this program. For the first time we are putting on a program in co-operation with an outside agency.

We are co-operating with the Southern Textile Methods and Standards Association in putting on two courses. One is a two weeks course in "Methods Analysis and Time Study" and the other is a two weeks course in "Methods Time Measurement." They will both be taught by Professor Joel Richardson. The Association will assist in the publicity.

The other courses are Yarn Manufacturing, Fabric Development and Supervisor Development. I especially recommend these first two for the trainee entering the textile industry who did not attend a textile school. The trainees are apt to enter a world of noise and confusion that makes no sense to them. If they attend these courses they will be taught what the machines are supposed to do, how they are supposed to do it, the theory of manufacturing and mill calculations.

The Supervisor Development Course is to acquaint the first line supervisor with the complex ramifications of his job. As the manufacturing problems become more complicated, this first line supervisor should be better prepared.

There are no entrance requirements and no college credit. If you are interested in more details drop me a line.

* * * * *

The enrollment in the school of textiles is the highest it has been in several years. The enrollment for this (the second) semester is 319 compared to 286 at the same time last year.

* * * * *

We are in the process of setting up a tandem card. I hope to get the whole thing largely as a gift. Reeves Brothers gave us two cards, Hollingsworth is clothing the cyclinders doffers and licker-ins and Ashworth will clothe the flats.

* * * * *

Professor Joel Richardson has been elected secretary of the Southern Textile Methods and Standards Association. Professor La Roche is in the process of being elected secretary of the American Quality Control Association, Textile Division and Professor McKenna is a treasurer of the Southeastern area of American Association for Textile Technology. Professor Campbell is on the Board of Directors of the Greenville Chapter of the Society for Advancement of Management.

Outstanding Seniors . . .

By

Jerry W. Blackwood, TM '64

JOHN DAVID BEVILL

John David Bevill is a twenty-one year old Textile Science major from Anderson, South Carolina. To aid with his college expenses, he received a Lowenstein Foundation Scholarship.

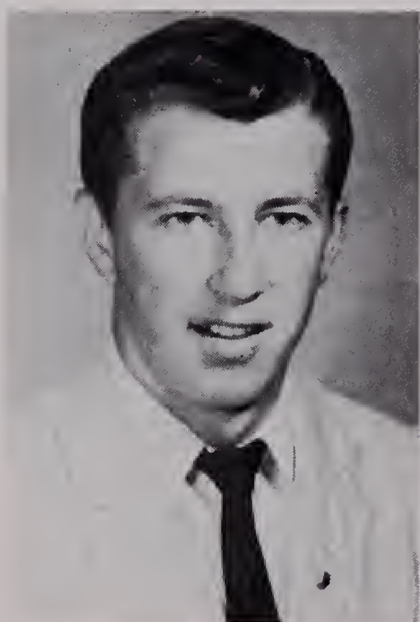
Dave has been kept busy by participating in several campus activities; these include: Phi Psi, Clemson Skin Diving Club, AA-TT, Dixie Sky Divers, and Hall Counselor of of B-9. He is enrolled in Advanced Army ROTC and is presently serving as Company Commander of Company B-2.

For the past five summers Dave has been employed by Orr Mills in Anderson. After graduation he plans to work in some phase of research in the Textile Industry.

DONALD D. HASTY

Donald D. Hasty is a Textile Management major from Camden, South Carolina; he is twenty-two years old and is married. Don has received a SCTMA scholarship to help finance his expenses at Clemson.

While at Clemson, Don has been an active member of SAM, Phi Psi, and AATT. During his Sophomore year he was a member of the Pershing Rifles. Last semester he served as a Hall Counselor in the 8th "barracks."



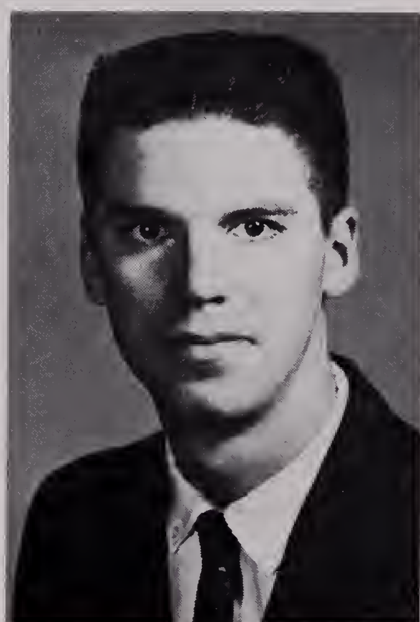
Don is a Distinguished Military Student and serves as Company Commander of Company D-2 in the Army ROTC. Upon graduation he plans to enter Flight Training in the United States Army.

ARCHIBALD M. CALHOUN

Archibald M. Calhoun, a twenty-one year old Clio, South Carolina, native, is a Textile Management major. He received honors during the second semester of his Junior year.

Last summer, "Mac" gained first-hand experience in the textile industry when he was employed by James Fabrics, a division of Burlington Industries in Cheraw, South Carolina.

"Mac" has been an active participant in intramural basketball during his four years at Clemson. Other of his varied activities include two years in Phi Psi, one year in NTMS and SAM, and three years with the Clemson College Glee Club.



Rovematic Roving Frames

The Rovematic Roving Frame is Saco-Lowell's new answer to the problem of demands for increased production on the roving frame. The first of the new roving frames moved off the production line in September, 1961, at Saco-Lowell Shops, Easley, S. C. Now it has been said that orders for the Rovematic has given the company a backlog of unfilled business extending well into 1962.

Unlike any roving equipment in use today, the Rovematic operates at speeds up to 1,200 RPM, and builds a 14 x 7 inch package. All the mechanisms normally located under the roller beam have been moved into the head end. The flyer is radically changed and is not removed from the frame for doffing.

According to reports from Saco-Lowell, "Ends down are virtually eliminated in the area between the front roll and flyer. In processing 1:00 hank roving, the Rovematic will doff in 3-1/4 hours and a 96-spindle frame can consume 96 bales of cotton per 120-hour week."

Lubrication problems are lessened with a new oil system. Mechanisms in both gear boxes are continually bathed with oil from a control pump. The main attention required is to check the oil level at several inspection windows.

A tandem differential mounted on a single shaft gives power to the Rovematic drive. Power is distributed to the flyers, spindles and spindle lead screws from this shaft.

The drafting element is described as a "marriage" of the Tru-Set top arm weighting system and the FS2 roll and apron arrangement used for some years on Saco-Lowell frames. Anti-friction bearings handle the high front roll speeds required and reduce the customary lubrication schedules.

Range of Total Drafts

Total Draft Constant	Draft Change Upper	Constant Gears Lower	Total Draft Change Gears	Approximate Range of Drafts
180	88	77	30 to 72	2.50 to 6.00
243	100	65	30 to 72	3.38 to 8.10
396	118	47	30 to 72	5.50 to 13.20

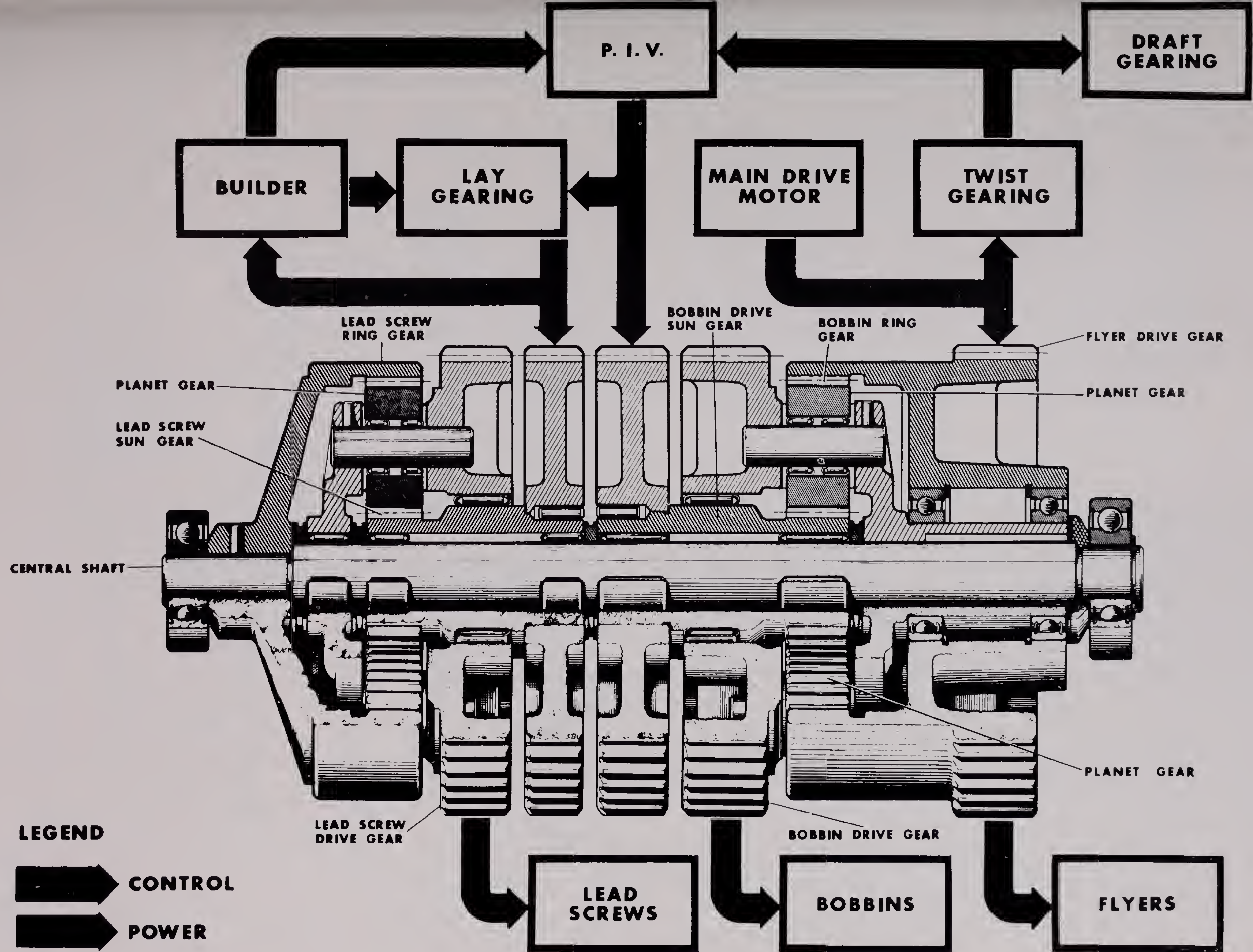
A new spindle and flyer arrangement used on the Rovematic is regarded as the significant change. The spindle assembly is a telescoping structure made up of two tubes. The inner traversing tube called the spindle is keyed against relative rotation to the outer tube called the bolster. A lead screw is mounted inside the spindle and engages a socket in the top of the bobbin.

Saco-Lowell has broken with conventional practice in building the Rovematic flyer, which is not removed from the frame for doffing. It has a head and foot end connected by lengths of steel tubing. The drive is through a splined connection in the foot end. The head is carried in a ball bearing mounted on a bracket projecting from the roller beam.

Both top and bottom have substantial rims which provide areas where weight can be removed by drilling for precision dynamic balancing. The paddle or pressure foot is made from diecast aluminum. Because of its light weight and tying together the flyer at both ends, flyer leg deflection is minimized.

A rubber nose piece on the flyer traps the twist between the top of the flyer and the bite of the front rolls, strengthening the strand. This is helpful in preventing end breakage at the front roll.

(Continued on page 12)


P. I. V.
DRAFT GEARING
BUILDER
LAY GEARING
MAIN DRIVE MOTOR
TWIST GEARING
LEAD SCREW RING GEAR
BOBBIN DRIVE SUN GEAR
BOBBIN RING GEAR
FLYER DRIVE GEAR
PLANET GEAR
PLANET GEAR
LEAD SCREW SUN GEAR
CENTRAL SHAFT
PLANET GEAR
LEAD SCREW DRIVE GEAR
BOBBIN DRIVE GEAR
LEGEND
CONTROL
POWER
LEAD SCREWS
BOBBINS
FLYERS

ROVEMATIC ROVING FRAMES

(Continued from page 10)

The Rovematic also has a flyer positioning system which is designed to automatically stop each flyer in the best position for piecing-up when an end comes down. The frame comes to a complete stop and then inches forward until the flyers are in the proper position.

Tension problems caused by belt slippage have been overcome in the Rovematic by use of a PIV (positive infinitely variable) drive, manufactured by the Link-Belt Co., Chicago. This drive, the twist gearing, lay gearing and differential are mounted in one oil-tight gear box. The builder mechanism is housed in a second box. These mechanisms are continually bathed with oil from a control pump.

The spindle and flyer assemblies are carried in ball bearings at all points where loads are appreciable. Spindle cases are oil tight. Gears on the lower drive shaft dip into oil in the bottom of the cases and throw it over all the internal parts, thus eliminating manual lubrication of spindle and flyer assemblies and their gear drives.

A totally enclosed fan-cooled motor delivers power to the flyer drive gear of the differential. This gear drives the flyer drive shaft in the spindle case at constant speed and acts as an idler to the flyer drive.

Actually, the differential is a tandem differential in which Saco-Lowell engineers have mounted two differentials on the same shaft.

Attached to the flyer drive gear is the bobbin ring gear. This meshes with a pair of planet gears and the bobbin drive gear which transmits power to the bobbin drive shaft and the bobbin sun gear.

A study of the accompanying illustration will show that if the bobbin sun gear is held stationary, the speed of the bobbin drive gear will be proportional to the flyer drive gear and the gear ratios in the remainder of the drive are such that flyers and bobbins would turn at the same speed. It is also obvious that if the sun gear is turned in the same direction as the flyer drive gear, the bobbin drive gear will turn faster and the bobbins will lead the flyers. This speed increment, added by the sun gear, is called the winding speed and must vary inversely with the package diameter. The variable speed of the bobbin sun gear is supplied by the PIV.

The bobbin drive gear and its cage are keyed to the central shaft of the differential and thereby turn the lead screw ring gear at the opposite end of the unit at the same speed. The lead screw ring gear meshes with two planets which also mesh with the lead screw sun gear.

If the lead screw sun gear is held stationary, the lead screw drive gear will turn in proportion to the bobbin drive gear and the gear ratios in the remainder of the train are such that the lead screws and the spindles will turn in unison and no traverse will result.

If the lead screw sun gear is turned in the same direction as the lead screw ring gear, it is obvious that the lead screws will turn faster than the spindles and the bobbins will traverse down.

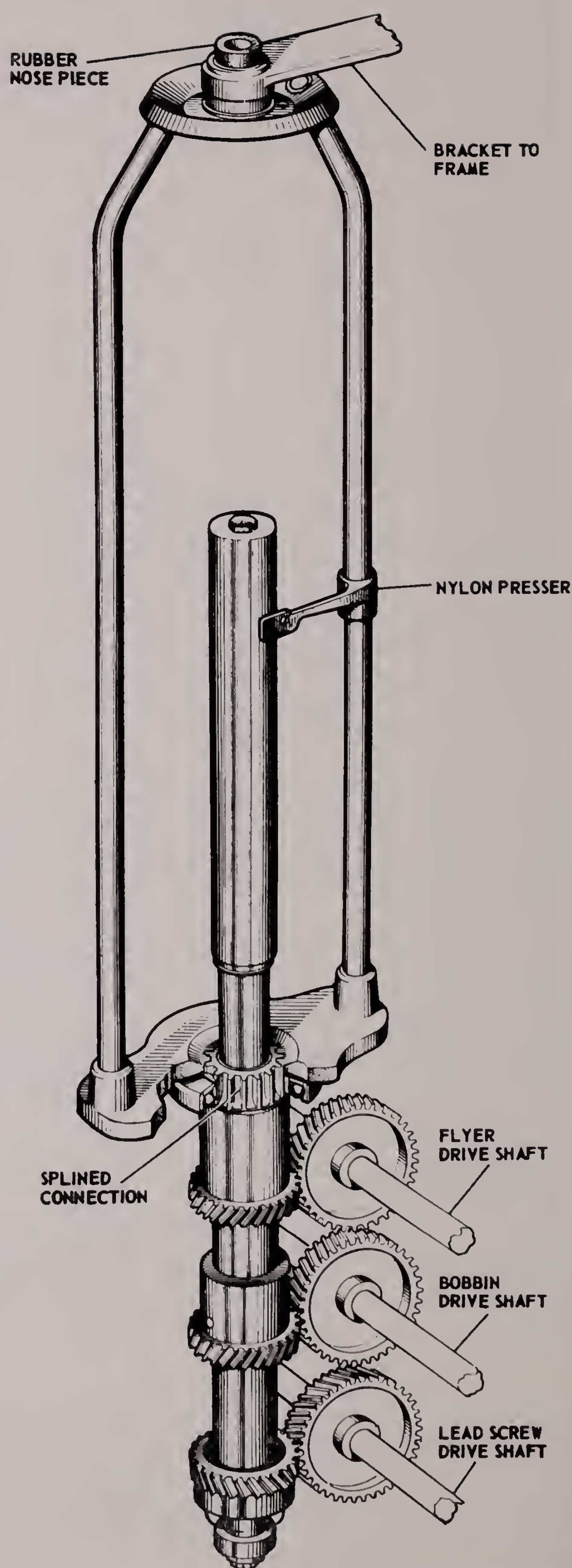
The lay gearing which drives the lead screw sun gear incorporates a change gear to vary its speed and thereby the rate of bobbin transfer. This, of course, determines the lay or distance between wraps on the bobbin.

The lay gearing also incorporates a pair of reversing clutches which are controlled by the builder. These determine the direction which the screw drive sun gear turns and therefore the reversals of the bobbin traverse. These clutches are the counterpart of the familiar twin gears on the conventional roving frame.

The builder's first function is to control the traverse reversals so that the length of traverse will shorten as each successive layer of roving is put on the bobbin. To accomplish this, Saco-Lowell provides a rocker shaft which connects the reversing clutch in the main gear box with the builder housing. A variation of a "load and fire" mechanism operates the rocker shaft, "firing" the shaft in successively shorter periods of time. The rate of shortening is determined by a change gear on the outside of the builder housing, which corresponds to the conventional taper gear.

The second function of the builder is to control the PIV so that the bobbin's RPM will decrease in just the right amount with each new traverse. The Rovematic accomplishes this by use of a 180° plate cam mounted on a shaft protruding from the back of the builder housing. The PIV control arm protruding from the side of the main gear box engages this cam. The plate cam rotates in very small increments with each traverse change in the builder mechanism and this controls the output speed of the PIV. The amount of rotation of the cam at each traverse change is determined by a change gear mounted on the front of the builder housing. This is the counterpart of the familiar tension gear on conventional frames.

(Continued on page 15)


RUBBER
NOSE PIECE
BRACKET TO
FRAME
NYLON PRESSER
SPLINED
CONNECTION
FLYER
DRIVE SHAFT
BOBBIN
DRIVE SHAFT
LEAD SCREW
DRIVE SHAFT

Four steps are required in doffing the Rovematic.

(1) A clutch handle on the front of the machine disconnects the drive from the PIV and the bobbin sun gear, locking the gear against rotation. This makes the spindles and flyers turn at the same speed so that the frame can be jogged and loose roving run up on the top of the flyer.

(2) A small hand wheel, located just above the clutch handle mentioned above, enables the operator to reset the builder to its maximum traverse position and to reset the PIV unit to its original starting or empty package position.

(3) In order to run the bobbins down to their lowest point in the traverse, a separate motor drives the lay gearing with all other gears in the head and stationary. This turns the spindle screws and the packages will traverse down.

(4) In this position, the packages are ready to be doffed without removing the flyers.

In developing the Rovematic, Saco-Lowell has attempted to eliminate the possibility of human error as much as possible. Only time and extensive useage of the Rovematic will tell whether this goal has been accomplished or not. In the Rovematic, Saco-Lowell has given us a new concept in roving frames. Will it do for you?

THE DUOCARD, A NEW CONCEPT IN WEAVING

Continued from page 6)

Since the two card cylinders operate in conjunction with each other, frequently it is not necessary to compromise on various settings. Each cylinder can be individually set to provide a specific quality control feature.

Results of tests run by Swift Spinning Mills show graphically the values of the DuoCard System. A detailed controlled test was set up at Swift with the DuoCard being run against a standard type card, both with the same type clothing and being in equal mechanical condition. All stock was controlled from the bale and through the processing equipment to eliminate any variable other than the cards themselves.

A thirteen ounce lap was fed to each of the card sets, and a resultant grain sliver of 55 grains per yard was delivered. Production at 100% efficiency on the DuoCard was 22.87 pounds per hour, and on the standard card the production was 8.10 pounds per hour. Flat strips on the DuoCard were 1.37%, and on the standard card the flat strips were 2.67%. Motes and fly waste on the DuoCard was 0.85% against 1.02% on the standard card. The total waste on the DuoCard was 2.55% against the standard card total waste of 3.87%.

The decrease of up to 1.3% in waste removed at the DuoCard has not affected the quality of the yarn because it can be set to remove the type and quality of waste on a more selective basis.

Uniformity on the DuoCard was a 2.2% reading, and on the standard card the reading was 3.2%. Neps in the DuoCard were checked on the Uster Imperfection Counter, utilizing 26s carded knitting yarn with a sensitivity of 3 on the imperfection counter. There were 60 neps in the DuoCard compared to 106 in the standard card. In the knitted fabric the DuoCard produced a brighter fabric. The yarn had a resultant skein break factor of 2088, and the U percent obtained from both the DuoCard and the standard card was approximately 14.1% U.

The imperfections per 1,000 yards were as follows. With the sensitivity set on 40 for thin places, the DuoCard reading was 300 vs. the standard card reading of 498. With the sensitivity set on 3 for thick places, the DuoCard reading was 100 vs. the standard card reading of 184. With the sensitivity set on 3 neps, the DuoCard reading was 60, and on the standard card the reading was 106.

The skein break factor averages about 3% better on the DuoCard. Ends-down in spinning averaged 8.11 per 1,000 hours on the DuoCard, and 9.0 on the standard card. Yarn produced from the DuoCard is cleaner, brighter, and has up to 70% nep count reduction.

The DuoCard should not require any change in quality control techniques. The frequency of checking DuoCards might possibly be reduced because of the increase in production.

The DuoCard System will not deter the trends toward automation of textile mills, but it should enhance automation.

P L E A S E !

Changed Address Lately?

Help us to keep our files up to date. Our sincere **thanks** to all of you who answered our appeal in the last issue. If you haven't answered, please fill in the form below and mail to:

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School of Textiles, Clemson, S. C.

Name ____________

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Mill or Company ____________

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1962

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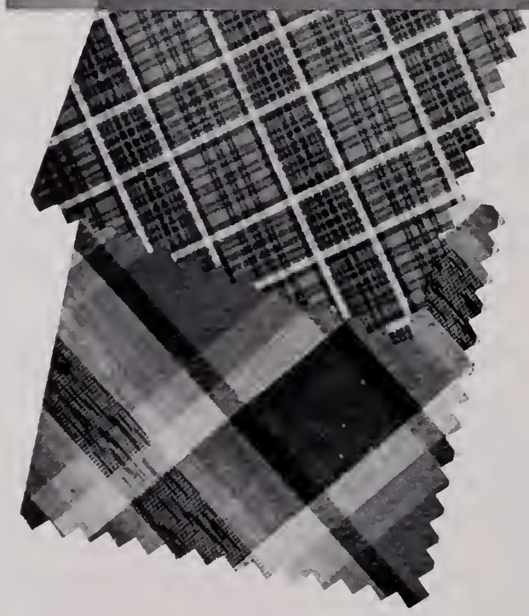

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THE

Bobbin & Beaker

Official Student Publication
Clemson Textile School

VOL. 19 | SUMMER ISSUE | NO. 4

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In This Issue

THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Textiles.

Address: The Bobbin and Beaker, School of Textiles, Clemson College, Clemson, South Carolina.

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from the Editor

The purpose of THE BOBBIN AND BEAKER, Clemson Textile School's magazine, is service to Clemson's textile students and also to be used as a medium of exchange for mill men who wish to express their views on subjects which are associated with the industry.

In return they receive, through reading this magazine, the thoughts of others who participate in this exchange of articles. All persons who receive THE BOBBIN AND BEAKER, approximately 2500, acquire essential information concerning new developments in the industry that occur most frequently in these times of mechanization.

This has been the puspose of this student publication since its beginning and the old staff has successfully completed its endeavor. It is now our duty, the new senior staff, to prove ourself by supplying the readers of this magazine with interesting and necessary facts at the time they are developed. We will endeavor to accomplish this task.

The new staff, as shown below is headed by W. E. Barrineau, Jr., a textile management major from Cades, South Carolina, as Editor. Seated from left to right, the new Business Manager is C. E. Crocker, Jr., a textile chemistry major from Enoree, South Carolina. R. R. Sarratt, a textile science major from Gaffney, South Carolina, will serve as Circulation Manager, R. W. Ellis, a textile chemistry major from Huntersville, North Carolina, will be the new Advertising Manager and J. W. Blackwood, a textile management major from Gaffney, South Carolina, will be the new Managing Editor.

—W. E. B.

The Textile School Takes On A New Look

By
Gary A. Hall, T.S. '64

The merger of the School of Textiles and the Department of Industrial Management will go into effect at the close of the current academic year. This announcement was made recently by Dr. J. K. Williams, Dean of the College. Dr. Williams stated that this move was made to add strength to our curriculum and our research industrial oriented progress.

The consolidation of the School of Textiles and the Industrial Management Department will be known as the School of Industrial Management and Textile Science. When the merger goes into effect, this newly formed school will be second only to the School of Engineering in total enrollment.

There have been no changes in personnel, but the Industrial Management Department does plan to move into Sirrine Hall this coming summer. They plan to occupy the east wing of the building. The textile research department which presently occupies that section will be shifted to the west wing of the building, where new facilities will be provided.

According to Dean Gaston Gage, Dean of the School of Textiles, the merger of the two departments has been slowly approaching reality for several years. In 1954, Dr. Trevillian, presently head of the Industrial Management Department, and a group of professors recommended the feasibility of an Industrial Management Department at Clemson with a designated curriculum. The question came up as to where the new department was to be located. Dr. Trevillian was selected to head the newly formed department, and probably because of the fact that he was an economics professor and the new department was very closely related to economics, it seemed only proper at the time to put the Industrial Management Department into the School of Arts and Sciences.

As time has progressed, many people have been convinced that there is more kinship between the Industrial Management Department and The Textile School than any other field. The textile industry is the largest single employer of the Industrial Man-

(Continued on next page)

agement graduates, and because of this fact, several Industrial Management Majors take a textile option which is offered to them in their curriculum.

The textile department has been teaching its students managerial courses for several years. The Industrial management students have also taken such courses in the textile school, such as quality control and costing. This is another reason that makes the fusion of the departments even more logical.

At the present time the School of Arts and Sciences has more professors than any other school. Every school at Clemson has students taking courses in the School of Arts and Sciences, such as mathematics and English.

A connection of the two schools takes a load from the Arts and Sciences Department, and at the same time does not overload the Textile School.

Even though there will be this union, there will be no change in the curriculum of either. The graduates will still receive degrees in their desired courses, such as Textile Management, Textile Science, Textile Chemistry, and Industrial Management. Each of these departments will still have its respective head, with Dean Gage over the entire School of Industrial Management and Textile Science. The consolidation has no effect of any special field the student wishes to enter. Administratively, it is simply a change of pulling Industrial Management out of Arts and Sciences and putting it with the Textile School. Whereas the Department was once connected with the School of Arts and Sciences, it is now united with the Textile School.

After all the evidence had been considered, it seemed only reasonable that the Industrial Management Department was more related to the textile school than any other school at Clemson. The officials felt that by joining the two schools, the I.M. graduates would have a well established background for all managerial positions with extra opportunities for a man who wishes to seek a future in the greatest industry of our section of the country—textiles.

The Dean Says

HELP AND COOPERATE

In the last issue of the Bobbin and Beaker I mentioned a tanden card. I said Reeves Brothers had given us the cards; Hollingsworth had clothed the cylinders, doffers, and licker-ins; and Ashworth had clothed the flats. Since then White Bearings of Charlotte and Dodge have given us the drives. Southern States of Hampton, Ga., is giving us two ball bearing comb boxes. Jenkins Metal Shops, Inc., of Gastonia is overhauling the screens. Elliott Metal Works of Greenville is fixing up the pan arrangement between the cards.

* * * * *

Burlington Industries delivered to our back platform a 204 spindle worsted length spinning frame. This frame will serve us well in our research program. We have considerable work to do on the middle length man made fibers. This frame came equipped with motors, switches and bobbins. This will go well with a worsted length roving frame recently given us by Judson Mills.

* * * * *

Wellman Combing has recently given us about 100 pounds of wool tops to use in our teaching.

* * * * *

Raleigh Farr and the Edda International Corporation have recently given the school a Titan tieing-in machine.

* * * * *

We are working toward equipping four chemistry research laboratories on the ground floor of the west wing. The research department and the college have put in masonry partitions and basic plumbing. We have bought the lights and are now negotiating for air conditioning. It will then take about $7,500.00 per laboratory to equip them. One of our friends has given us $7,500.00. We have three more to go.

* * * * *

The point of this whole story is that I am overcome when I think of the people who are willing to help us when they know our needs.

Dean Gaston Gage

Outstanding Seniors . . .

By
Douglas V. Rippy, T.M. '64

Speight L. Bird

Speight L. Bird is a 22 year old Textile Management major from Rock Hill, S. C.

Speight sings with the Phi Kaps and is a member of the Phi Delta Kappa fraternity. He played basketball his first 3 years at Clemson and is a member of the Block "C" Club. He was also MC at Tigerama.

Working for Kayser-Roth Corporation during summer vacations has given Speight valuable training in industry. Upon graduating, Speight plans to enter the U. S. Navy for 2 years. After this he is going to seek employment in industry.

Spurgeon B. Brian

Spurgeon B. Bryan is a married, 22 year old, Textile Science major from Campobello, S. C. He has received scholarships for 1 year each from Geiger Dyestuffs and Seydel Woolen, and a 4 year Inman-Riverdale scholarship.

Among his varied activities at Clemson, Spurgeon is active in the AATT, SAM, PHI PSI, BSU, and he is a platoon sergeant in the Army R.O.T.C.

Spurgeon has worked at Inman mill during past few summers. He also worked at Kenneys Shoe Store on weekends. After graduation he is planning on entering the Army for a while then either to graduate school or into some phase of the Textile industry.

George T. (Tom) Mahaffey

George T. (Tom) Mahaffey is a 21 year old Textile Management major from La Grange, Georgia. He is attending Clemson on a basketball scholarship.

Tom played basketball four years and was captain of the team his senior year. In addition to basketball, he is active in the AATT and the Block "C" clubs. Tom is also a member of the Delta Kappa Alpha fraternity.

Employment by Calloway Mills for the past 4 summers has given Tom much valuable experience in the Textile industry. Upon graduating, he plans to accept employment with Wellington Mills, a division of West Point Manufacturing Co., in Anderson, S. C.

Textile Quality Control

By W. S. McMann, Assistant Director
Quality Control Department, Dan River Mills, Incorporated

Textile Quality Control has so many facets it can hardly be considered the exclusive province of any individual or any single department regardless of how devoted or energetic the persons themselves may be. In order for any textile organization to take the giant steps forward in the control of quality as has become necessary due to the increased competition evident in recent years it has been necessary to attack the problem from many directions.

In the first place, adequate progress is not possible without a planned program of machinery modernization to go hand and hand with sound mill practices.

The use of statistical concepts in the control of quality in yarn manufacturing is so widespread that it seems hardly worthwhile to emphasize the importance. No one will dispute or take exception in any way with the necessity for sampling, testing, evaluating and reporting for correction such factors as weight and uniformity in picker laps, card sliver, drawing sliver, roving and yarn. In addition, the use of seriplanes for evaluating yarn character and the making of nep counts in card web and drawing sliver are also practices which are considered standard in most textile manufacturing organizations. In other words, the controlling of yarn quality is not a matter of finding a means of evaluation and means of improvement. The means are present. The problem is simply one of deciding how much effort should be expended for the results desired.

Once we pass the point of yarn manufacturing, however, the problem of handling quality control splits up from what is a routine method of handling into a very, very varied number of practices, depending upon the individual mill. The reason for this

(Continued on next page)

divergence at this point can be traced in general to the many different methods used in evaluating the quality of woven textiles.

Some years ago the American Society for Quality Control, in conjunction with the National Association of Shirt, Pajama and Sportswear Manufacturers, proposed to the industry that a sound method of evaluating the quality of woven textiles was to use a point system of grading fabric imperfections.

This system in general called for the assignment of 1 demerit point for a defect from 1" to 3" in length, 2 points for a defect 3" to 6" in length, 3 points for a defect 6" to 9" in length and 4 points for a defect in excess of 9" in length, with the further provision that no more than 4 points were to be assigned to one square yard of fabric.

This system of grading fabrics has many fine points to recommend. The first and most obvious is the fact that two different people can use this system and generally come up with the same number of points per 100 yards. There are several things that have to be qualified just as in most other programs. The most obvious one is the fact that some limit must be set on how small in thickness a slub can be and still be scored as a defect. Once this lower limit is established for slubs, knots, gouts, etc., there are few other problems encountered.

The most advantageous part of using this system of grading cloth, in my opinion, is in the field of quality control. If we grade our fabrics and simply make a decision as to whether they are first quality or second quality, we are then able to sort them for shipment but we have very little other information to aid us in making an improvement.

During the years that Dan River Mills has been using the point system of grading, we have gained so much confidence in its merits that on most occasions when an inquiry is made concerning the quality level of a fabric, the answer is given in the average defect points per 100 yards rather than percent seconds. Every time the Quality Control Department draws a random sample for examination on any fabric, a report is sent back to the grey mill or finishing mill, depending upon which goods we are checking, specifying the quality level in terms of points per 100 yards. In addition, each time a sample is drawn and evaluated by the point system of grading, we always determine in that sample which three defects are outstanding and how many points per 100 yards are chargeable to each defect. By doing this we are able in a very short period of time to determine for any one fabric just which defects are occurring most frequently. By working in the weave room or spinning room or whatever department is indicated towards the elimination of the defects creating the most points, we find our efforts towards improvement bear fruit much more quickly than any other system we have been able to use.

In brief, then, we believe the industry has available sound systems of evaluating both visual and physical irregularities, and we know the only way improvements can be made in either area is through the reporting of deficiencies encountered to the individual directly responsible for their prevention. In summary, then, we have three factors necessary for controlling quality. They are, (1) detection of irregularities, (2) reporting to the responsible individuals and (3) correction. In our established systems we have means of carrying out these three jobs in a scientific manner.

Phi Psi News

by

Robert R. Sarratt, Secretary, T.S. '63

On April 10, 1962, Iota Chapter of Phi Psi conferred membership on seven new members just brought into the chapter. The new brothers are Harold D. Turner, a Textile Management major from Inman; Ben M. Smith, a Textile Management major from Fountain Inn; Johnny M. Butler, a Textile Chemistry major from Rock Hill; S. Howard Jones, a Textile Science major from Sumter; Steven D. Tucker, a Textile Management major from Spartanburg; L. Mickey Clyburn, a Textile Management major from Kershaw and Reggie L. Smith, a Textile Management major from Anderson.

Sitting (L-R): C. E. Crocker, Vice Pres.; G. L. Harmon, Pres.; R. R. Sarratt, Sec.; Standing: S. H. Jones, Social Chairman; J. M. Butler, Senior Warden; S. B. Brian, Junior Warden; R. W. Ellis, Treas.

Earlier in the year, three other brothers were brought into the chapter. They were George Harmon, a Textile Management major from Chesterfield; Bill Hendrix, a Textile Science major from Conestee; and Robert Sarratt, a Textile Science major from Gaffney.

Shortly after the first of the year, a steak supper was held at Dan's, with most of the brothers attending. Dean Gage spoke to the chapter following the dinner on "The Common Market." We had a very good dinner and everyone seemed to enjoy the meeting and speaker.

This spring seven of the members took a field trip to Enka, N. C. to visit the American Enka Rayon Plant. They arrived early in the morning, toured the plant, ate dinner and came back to Clemson that afternoon.

Plans are being made by seven of the brothers to attend the National Phi Psi Convention in Charlottesville, Virginia, on May 3, 4, and 5. The convention will be held at the Monticello Hotel in Charlottesville. The program includes visits to the Institute of Textile Technology, University of Virginia, Monticello, and Ashlawn. The latter two being the homes of Thomas Jefferson and James Monroe, respectively. The group from IOTA Chapter will consist of: George Harmon, Crawford Love, Spurgeon Brian, Bud Smith, Tommy Templeton, Mickey Clyburn and Steve Tucker.

At the April 10 meeting, elections were held with the pictured officers elected for next year. In addition to those pictured, Mickey Clyburn was elected editor of Phi Psi.

We, the members of Phi Psi, wish all our graduates the best of luck in their professions. We feel that these men are among the **best** that Clemson has graduated!

REMEMBER

For the fifth summer the School of Textiles is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for the college graduates, other than textile school graduates, who will enter the industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

COURSES

Yarn Manufacturing—Theory and Laboratory—Date Offered—June 11 or July 9, 1962

Fabric Development—Theory and Laboratory—Date Offered—July 9, 1962

Supervisor Development—Theory—Date Offered—June 11 or July 9, 1962

Methods Analysis & Time Study—Theory and Laboratory—Date Offered—June 18, 1962

Methods Time Measurement—Theory and Laboratory—Date Offered—July 9, 1962

For Additional Information Write:

Gaston Gage, Dean
School of Textiles
Clemson, S. C.

APPLICATION FOR SUMMER SHORT COURSES
Clemson College School of Textiles
Clemson, S. C.

Name of Student ____________________ Address ____________________

Sponsoring Company ____________________ Address ____________________

Course Desired ____________________ Date of Course ____________________

Live in Dormitory and Take Meals in Dining Room: Yes ☐ No ☐

Commute: Yes ☐ No ☐ Check enclosed ☐ Amount $________ Will pay on arrival ☐

AATCC Report

by

Charles Funderburke, Secretary, TC '65

The American Association of Textile Chemist and Colorist Student Club meets every second Tuesday night in the Lounge to discuss plans in which the Club wishes to participate.

Of the three plant trips that the Club decided to take this year, we visited Utica Mohawk near Clemson for a brief tour of their manufacture and finishing processes in October. We visited Enka Corporation at Enka, N. C., April 3, 1962 and viewed their rayon manufacturing plant. On our return home we visited Cranston Print Works at Fletcher, N. C., and toured their printing and finishing operations.

Our Christmas dinner was held December 16, 1961, at which Mr. R. J. Breazeale, former teacher of textiles at Clemson and now sales representatives for Warwick Chemical Company in Rock Hill, was our guest speaker. He spoke on Wash-N-Wear finishes using the progressive increase in use of the various resins that have been used in the finishing of these fabrics as illustrations.

Our next dinner is planned for May 8, 1962, when we will be honored to have Mr. Jack Emerson, representative from Sandoz, Inc., Charlotte, N. C., as our guest speaker. He will talk to us on various principles of printing, including a demonstration of screen printing in which a T-shirt will be printed for each member present.

Sitting (L-R): T. R. Sherbert, Treas.; C. A. Funderburke, Sec.; B. A. Cox, Vice Pres.; Standing: J. J. Belcher, Pres.

Our class officers for next year were elected April 17, 1962. They are as follows: Joe Belcher, President; Barry Cox, Vice-President; Charles Funderburke, Secretary and Ray Sherbert, Treasurer. Mr. Joe Lindsay is our club advisor.

In concluding the hi-lites of the AATCC Student Club, we would like to congratulate our Textile Chemistry graduates this year and wish them a successful future. They are Gene Phillips, Eric Anderson, Stanley Rose, Jerry Byrd, Bob Hartzog, Ned Pruitt and Tommy Templeton.

American Association for Textile Technology Inc. News

by

Spurgeon B. Brian, Secretary, TS '63

From seventeen members last year in the old N.T.-M.S., the Clemson student chapter of the American Association for Textile Technology has increased its membership to forty-eight members. These forty-eight members are charter members. They have the distinction of belonging to the student division of one of the larger professional organizations of textile technology.

On April 10, 1962, the A.A.T.T. elected officers for the 1962-63 sessions. Harold D. Turner was elected president of A.A.T.T. Harold is majoring in Textile Management, and his hometown is Inman, S. C. Donald R. Langley, a Textile Management major from Johnsonville, S. C., was elected Vice-President. Elected to fill the office of Secretary was Spurgeon B. Brian, a Textile Science major from Campobello, S. C. George L. Harmon, Textile Management major from Chesterfield, S. C., was elected to the Treasurer's post. Selected for the office of publicity director was David B. O'Neal, a Textile Management major from Mullins, S. C. The faculty advisor is Mr. Joel L. Richardson.

Sitting (L-R): D. B. O'Neal, Publicity Chairman; G. L. Harmon, Treas.; S. B. Brian, Sec.; Standing: H. D. Turner, Pres.

Activities during the past year have included tours of various textile plants, guest speakers, and movies concerning textiles and management. The A.A.T.T. visited a narrow fabrics plant in Greenville, S. C. and Rocky River Mills, a woolen mill, at Calhoun Falls, S. C. Guest speakers have included Mr. Gaston Gage, Dean of the School of Textiles, Mr. John T. Wigington, Director of the A.C.M.I. here at Clemson and Mr. Charles A. Fagan from Deering-Milliken Corporation.

The Club has seen excellent movies on quality control and the responsibilities of a supervisor.

With its selection of new officers, the Clemson Chapter of A.A.T.T. is on its way to becoming a leading campus organization and one of the leading student chapters of the American Association for Textile Technology.

There's A Career for You -- In Textiles

Prof. T. A. Campbell
Head of Textile Management Department

The textile industry is expanding at a rapid pace in the South and more especially in the Carolinas. A young person planning a business career could select no better environment than the Carolinas. This is home and there are excellent opportunities for the young people who have had good training and possess qualifications required in this progressive and expanding industry.

It is not necessary to have a college education to go into the textile industry, because the mills train, to a certain extent, and the rest is left up to the worker and he can go forward if he shows initiative and interest. One mill manager reports that bright high school graduates can advance faster from learner to a job classification in textiles than any other industry. The jobs open to the high school graduates after a training period are retail clerks, office assistants, assistant foreman and foreman, warehouse workers, and production operators. The extent of formal education is very important, but the lack of it is no absolute bar to advancement. Frankly, the person who ends his education with high school handicaps himself because college education is more usual today than it was a generation ago.

We are fortunate to have four good textile schools in this section of the South; North Carolina State. Raleigh, North Carolina; Alabama Polytechnic Institute, Auburn, Alabama; Georgia School of Technology, Atlanta, Georgia; and Clemson College, Clemson, South Carolina. These schools are well equipped to train the young man or woman in textiles and other courses related to mill work.

Just to give an idea of the scope of job possibilities for the technically trained college graduate, a few are enumerated: machinery designers, engineers, chemists, accountants, salesmen, stylists and designers, and related activities. Mr. Robert T. Stevens of J. P. Stevens & Co., Inc., says "It looks like a fascinating future to me. Changes in the textile business, since I entered it 40 years ago, have been fabulous. Because of increasing research, these changes, how-

ever, will seem small by comparison with the changes that will occur over the next 25 years. Those of us who do the best job in research will in my judgement, achieve in the future results that today would seem incredible."

The textile industry employs more women than any other industry with the greater majority of them being unskilled. It can readily be seen that the girls have a definite place in this industry. Rates of pay are commonly equal for men and women doing the same type of work. Women are preferred for many jobs because of superior patience and dexterity. Girls can expect to be earning an income within a few months, higher than possible in any other field requiring similar training. In addition to mill jobs, there are openings for laboratory and designing assistants, clerks, stenographers, telephone operators, receptionists, personnel interviewers, nurses, cafeteria managers and etc. Girls with training beyond high school may find many other opportunities. Women frequently excel in research work and the woman chemist or textile graduate will find a warm welcome from many mills with salaries and opportunities equaling those of men.

Despite labor saving devices and almost complete mechanization, the textile industry, which is the third largest industry in the United States, has consistently ranked as one of the largest providers of jobs. Over 33% of the American textile industry is in South Carolina alone. South Carolina's 325 textile mills consume more than one-fourth of all the cotton grown in the United States. These and other vital statistics of the ever-growing textile industry prove that there's a career awaiting our young men and women in textiles.

P L E A S E !

Changed Address Lately?

Help us to keep our files up to date. Our sincere **thanks** to all of you who answered our appeal in the last issue. If you haven't answered, please fill in the form below and mail to:

THE BOBBIN AND BEAKER
School of Textiles, Clemson, S. C.

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Position ______________________________

Mill or Company ______________________________

Local Address ______________________________

- Editorial -

TEXTILES IN THE SPACE AGE

In a quiet, effective way, the textile industry is pressing forward to keep step with man's exploration of space and has already made distinctive contributions to the overall space program.

Of particular interest thus far is the specially-designed suit worn by Col. John H. Glenn, Jr., in his recent triple-orbital flight, and the parachute arrangement for slowing by degrees the space capsule's return after re-entering the earth's atmosphere.

Of importance to future planning is the research now being done on the resistance of textile fabrics to radiation.

Certain textile products are also used in the nose cones of missiles, and other uses of textiles in the space program will be developed.

Colonel Glenn wore a 20-pound aluminized nylon and rubber garment when he orbited the globe three times on Feb. 20, 1962. The suit provided him with air conditioning and a stand-by environment that could simulate the atmosphere of the earth in case of a capsule failure. When the temperature inside the capsule during the historic flight went up to 108 degrees, Colonel Glenn turned on air conditioning controls in his space suit.

Glenn's space suit was the result of research that had gone on for many years by private companies and the armed services. It was built by the B. F. Goodrich Company of Akron, Ohio, on specifications of the National Aeronautical and Space Administration. It was a modified version of the U. S. Navy pressurized flight suit developed by Goodrich and the Navy. The suit contained a complete communications system, was custom-fitted to the body and each of the 1,600 separate pieces had been tested under conditions four times as severe as those they might be subjected to in use.

Although this suit performed admirably, it is only the forerunner of more elaborate and effective suits that will be developed as the space program progresses and journeys are made to more distant goals in space.

The parachute that was used by Colonel Glenn, as well as by Astronauts Shepard and Grissom in earlier, sub-orbital flights, was also specially built of specially designed fabric. The "rip-stop" action permitted the parachute to open gradually until it reached its full spread of 63 feet to bring the space capsule down at only 30 feet per second.

Research goes forward apace with space exploration, and the research having to do with the textile contributions to the program are being pushed along with other research.

All who earn a living in the textile industry can be proud of our industry's contributions to the space program thus far and be assured of even greater efforts in the future.

—W. E. B.

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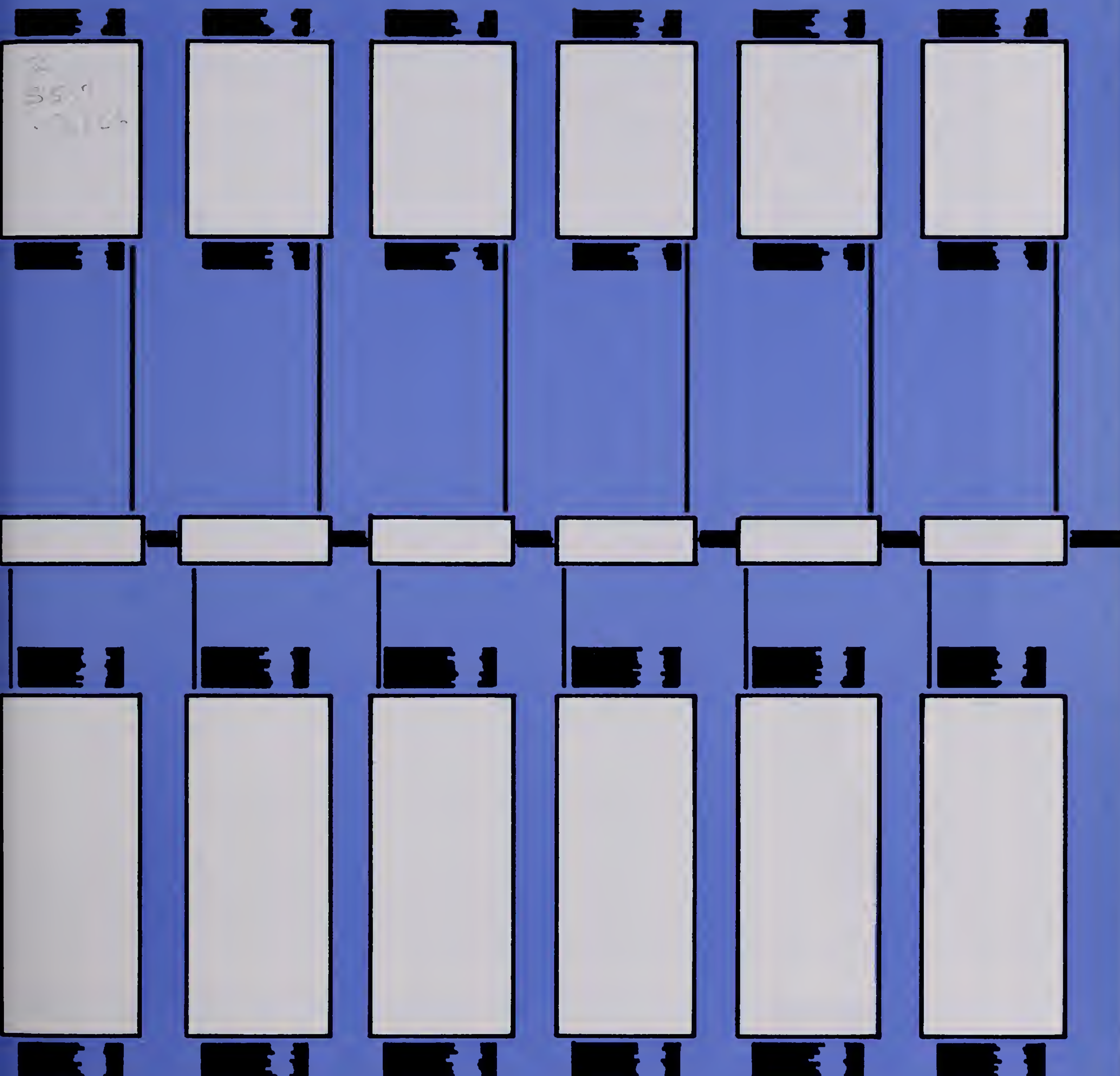

FALL 1962

CLEMSON

bobbin and beaker

THE

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Official Student Publication
Clemson School of Industrial Management and Textile Science

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from the Editor

In this issue we have many and varied articles of interest to the textile industry. Among these are articles concerning "Our Export Challenge" and an insight into the use of air conditioning.

The newest addition to the Textile Chemistry staff, Dr. J. J. Porter, is also featured in this edition.

Seated left to right: C. E. Crocker, Jr., Business Manager; R. R. Sarratt, Circulation Manager; R. W. Ellis, Advertising Manager; J. W. Blackwood, Managing Editor. Standing: W. E. Barrineau, Jr., Editor.

Our New TITAN Tying-In Machine

Pictured above is Mr. Bjarni Gudjonsson, President of Edda International Corporation, presenting a TITAN Warp Tying-in machine to Dr. Robert C. Edwards, President of Clemson College. In the background are students and staff members of the School of Textiles.

Last spring the Edda International Corporation, Bjarni Gudjonsson, President, presented to Clemson College and the School of Textiles a TITAN Warp Tying-in machine.

This gift was designed to aid the teaching and research programs in the field of textiles. Dean Gage reports, "The versatility of the TITAN Tying-in machine makes it especially valuable to us. We have looms of many widths running a wide variety of yarns and fibers. We are very pleased with the results we are getting and greatly appreciate this gift."

The Dean says...

As you all know, on July 1 the Department of Industrial Management and the School of Textiles were combined. The Department of Industrial Management had been, since its organization, in the School of Arts and Sciences. This was a logical change because there is more natural kinship between Industrial Management and Textiles than there is between Industrial Management and any other field.

The textile industry is the largest single employer of Industrial Management graduates. About one third of the Industrial Management students accept employment in some phase of the textile industry. Most of these young men have no idea of going into textiles when they enroll at Clemson. As graduation date approaches they suddenly discover that the most attractive jobs by location, pay and opportunity are in the textile industry and that is where they settle.

We are making a study of what can be done to better prepare these young men for a career in textiles. The courses will have to come late in the college program because that is when the student decides on his career field.

There are 906 students in this school this year. There are 588 in Industrial Management, and 318 in the three textile curriculums. This is an increase of 45 in Industrial Management and 15 in the textile programs. In textiles, the enrollment of new students is down from last year but the increase comes from the many students who change courses after their initial enrollment. There are about 100 second year students taking textile courses. This is the largest number in several years.

Dean Gaston Gage

Outstanding Seniors . . .

By Jerry Blackwood, TM, '64

George L. Harmon, Jr.

Twenty-one year old George L. Harmon, Jr., is a Textile Management major from Chesterfield, South Carolina. For his last two years of college, he has been awarded a Sonoco Products scholarship.

Last summer, George gained first-hand experience in the textile industry when he was employed by James Fabrics, a Division of Burlington Industries in Cheraw, South Carolina.

While at Clemson, George has been an active member of several campus organizations, and this year he is President of PHI PSI Treasurer of AATT, a senator of the Council of Club Presidents, and a member of Blue Key. He is a Distinguished Military Student and serves on the Battalion Staff as Cadet Captain.

Scholastically speaking, George has received high honors one year and honors for two years.

Leon J. (Bill) Hendrix is a twenty year old Textile Science major from McBee, South Carolina. To aid with his college expenses he received an Owens-Corning Fiberglas Scholarship.

This year Bill is serving as President of the Clemson College Student Body. In this capacity he has represented Clemson as a delegate to the South Carolina Student Legislature and to the Southern Universities Student Government Association.

Leon J. Hendrix, Jr.

During his college career, he has kept busy by participating in several campus activities; these include: Tiger Brotherhood, Blue Key, Phi Psi, Phi Eta Sigma, Phi Kappa Phi, Numeral Society (Social Fraternity), Senator, and Hall Counselor.

For the past three years Bill has maintained a high scholastic average and has received high honors every semester. After graduation he plans to attend Graduate School, but at the present time he is still undecided on the institution.

James E. Burch is a Textile Management major from Lake City, South Carolina; he is twenty-two years old and is married. He has received honors for two semesters of his college career.

James has been an active member of the American Association for Textile Technology. He is also a member of the textile honorary fraternity, PHI PSI. He received valuable experience in the textile industry last summer when he was employed by Kingstree Manufacturing Company, a division of Deering-Milliken.

Upon graduation James plans to enter the Officers Training School of the United States Air Force.

James E. Burch

Our Export Challenge . . .

The American textile industry has been a force in international trade since the days when John Quincy Adams was President of the United States nearly 150 years ago, but world-wide demands for certain types of American-made goods cannot be satisfied because of "cleverly contrived trade obstacles", according to William E. Reid, president of Riegel Textile Corporation.

In a speech before the recent annual meeting of the South Carolina Textile Manufacturers Association, Mr. Reid said recent international conferences dealing with textiles have pointed out that both the American textile industry and the American government "must intensify our export efforts".

"Up to now our representatives at these conferences have been concerned for the most part with the disruption of our home markets by imports from countries with wage and living standards far below those which we have here," Mr. Reid said. "As the discussions proceeded, especially with those countries which have come to assume that they are entitled to ready access to our markets but which rigidly bar imports from all other sources into their own preserves, our delegates came to realize that our industry, too, in view of what it has to offer, is deserving of an even higher place in international trade and that we should not be shy about demanding it.

(Continued on next page)

"To me, exports and imports are two sides of the same coin. What the industry now faces is not an import or an export problem as such, but a world trade problem."

Mr. Reid pointed out that the American textile export trade has undergone a "saddening contraction" since 1947 when all-time records were set with overseas sales of one-and-a-half billion yards of cotton piece goods and 233 million square yards of man-made fiber goods.

"The industry did not look for a continuance of this abnormal volume, but it also did not expect the drop to one-third of this yardage in cotton goods and about one-half in man-made fiber fabrics," Reid said.

He pointed out that about 50 nations have raised virtual embargoes against U. S. textile products, and 20 others maintain substantial restrictions against American-made goods.

"Among the concealed harassments that American exporters constantly encounter," Mr. Reid explained, "are inordinate delays in passing samples through customs, high charges for permits to solicit business, currency tinkering, trafficking in licenses, and other corrupt practices that are unknown or overlooked . . . These are the sort of hidden traps that are difficult to discover and uproot, and are used by many countries to prohibit entry of American textiles."

He also pointed out that American import tariffs on textiles are, in practically all cases, lower than those prevailing in world markets, including the friendly allied nations of the world.

"The elimination of trade barriers throughout the world will give a freer access to countries with improving living standards and rapid economic growth," Mr. Reid said. "We must be good enough businessmen to take advantage of this opportunity. You can bet your bottom dollar that the nations exporting to the United States are going to use every means at their disposal to improve their position in our markets."

Better Work and More Comfort

Fifty-four years ago air conditioning, as we know it today, was born in a cotton textile plant at Belmont, N. C.

Some three hundred years ago, when spinning and weaving was done in the home, the British learned the yarn was easier to handle and the cloth more uniform when the work was carried on in a damp basement.

Later, when cloth making became a factory industry, mill owners first tried to control humidity by pouring water on the factory floors. Later, efforts were made to keep moisture in the air by atomizing water into particles so small they evaporated before drizzling down on the machinery.

Early in the 20th Century, a North Carolina textile engineer, Stuart Cramer, patented an improved atomizing nozzle that gave still more humidity, and to promote his invention, he called it air conditioning. Today, however,this method of controlling humidity is called "humidification," since temperature is not affected.

Several years after Cramer's invention, Dr. Willis Carrier, an employee of a New York firm, invented the "air washer" and installed his first model in the Chronicle Mill at Belmont.

His "washer" was a big metal box, open at each end. Inside the box, spray nozzles produced a dense water spray and a centrifugal fan pulled air through the washer. Eventually, this system was developed sufficiently to be able to maintain a constant year-round relative humidity.

Air conditioning finally arrived when Dr. Carrier, who became one of the founders of Carrier Corp., a manufacturer of air conditioning equipment, thought of cooling the water in the air washer's chambers and delivering the cool, humid air wherever needed.

While the primary efforts of the air conditioning system were directed at the textile industry, air conditioning expanded rapidly. It was extensively used in movie theaters—remember the signs "20 Degrees Cooler Inside?" It extended to hotels, office buildings, apartment houses, department stores, and, in recent years, to the American home and automobile.

Thus, a need of the textile industry brought forth something that has enabled man to work better and in more comfort.

Have You Changed Your Address Lately?

If you have, we here at the "Bobbin & Beaker" would like to find out about it!

On the last several issues of the "Bobbin & Beaker" we have had anywhere from fifty to seventy-five issues returned. These issues came back from addresses that we have on file where the addressee has either moved or has in some way changed his mailing address.

Our mailing budget is run on a very tight schedule and we would more than appreciate any cooperation that you, our readers, would give us when you change your address.

We, the students of the "Bobbin & Beaker" staff, want everyone to receive a copy of our publication who is interested in Textiles and Clemson. We, however, can not send you our magazine unless we have your correct address. So please help us out!

If you have recently changed your address, please send your correct address to "Bobbin & Beaker" School of Industrial Management and Textile Science, Clemson College, Clemson, S. C.

QUIPS

Visitors to Cape Canaveral may be startled to see an astronaut-type space suit dripping dry on a clothesline. Made of a special coated cotton fabric, the new washable suit looks like an astronaut's oufit but it has been designed for workers fueling Titan II missiles. The specially made suit protects missile men against fuel spills or vapors while they conduct final checks during countdown.

* * * * *

Japan, which has flooded the United States markets with millions of yards of low-cost fabrics and garments, now is complaining about imports of "cheap, low-wage" textiles from other countries, primarily Hong Kong, Taiwan, India, Pakistan and Communist Red China.

TEXTILE SEMINAR HI--LIGHTS

By Gary Hall, T.S. '64

For the third year, the School of Industrial Management and Textile Science is sponsoring the Clemson College textile seminars. A prominent executive in the textile field will speak to the students once a week.

The program has been very successful for the first two years, and this success has prompted the continuance of the credit course for Clemson juniors and seniors in the School of Industrial Management and Textile Science. The speakers from the different organizations combine to offer a strong, well balanced program.

Heading the impressive list of visitors was R. Dave Hall, president of the American Textile Manufacturers Institute. He spoke October 2 on the history and aims of the institute. Mr. Hall, who is chairman of the board of Climax Spinning Company, president of Belmont Hosiery Mills and Belmont Knitting Company, and secretary of both the Sterling and Stowe Thread Company, is a graduate of Davidson.

There will also be five Clemson Alumni among the speakers. They are: R. A. Liner, vice-president of Greenwood Mills, Greenwood; W. D. Clark, general sales manager, Celanese Fibers Co., Charlotte, N. C.; R. P. Timmerman, vice president of the Graniteville Co., Graniteville; Bruce Ezell, textile waste consultant, Ninety-Six; and Frank C. Rogers, Jr., vice-president of Reeves Brothers, New York City.

Two other New York men will be included among the guest speakers. They are: James I. Shotwell of Deering Milliken, Inc., and Harris Rubin, executive vice-president of Burlington Men's Wear Company.

The seminars will be rounded out by three area executives, all enthusiastic supporters of the Clemson Program. They are: Fred B. Dent, president and treasurer of Mayfair Mills, Arcadia; Eugene E. Stone III, president of Stone Manufacturing Co., Greenville; and Robert W. Smith, president of M. Lowenstein Cotton and Storage Corp., Anderson.

With both motors of his plane hopelessly on fire, the pilot showed classic courage. As he donned a parachute, he shouted to the passengers: "Don't anybody panic. I'm going for help now."

Seen at the Southern Textile Exposition . . .

Upper Left—Clemson Booth where Clemson Graduates register and talk with their former "Profs." Clemson students register here in order to qualify for an excuse to miss class and their "Profs."

Upper Right—A Draper Diamond D. Doffer being demonstrated to a group of people from Clemson College by John Cugina, Project Engineer.

Bottom (Left and Right)—Pierce A. Cassidy, of Baxter Textile Machines Inc., explaining the features in the design of the Picanol "President" Loom to Clemson Students and Faculty. The Textile Students pictured above are Tommy James, John C. King, Jerry Blackwood, and Spenser Bates. The Textile Faculty pictured above are H. H. Perkins, Research Staff; W. E. Tarrant, Assoc. Prof. of Weaving; and J. V. Walters, Assoc. Prof. of Textiles.

A NEW YEAR, A NEW NAME, and a NEW ADMINISTRATION

The central trade association for the nation's textile industry got both a new name and a new set of leaders October 1, when the American Cotton Manufacturers Institute (ACMI) became American Textile Manufacturers Institute and William H. Ruffin of Durham, N. C., was elevated to the presidency.

The word "textile" replaced "cotton" in the name in order to reflect more adequately the multi-fiber nature of the textile industry.

Mr. Ruffin, president of Erwin Mills, Inc., succeeded R. Dave Hall of Belmont, N. C., chairman of Climax Spinning Company, as the industry's chief spokesman after serving during the past year as first vice president of ACMI. Robert T. Stevens of New York, president of of J. P. Stevens and Co., Inc., moved up to first vice president and William E. Reid of New York, president of Riegel Textile Corporation, became second vice president.

The name change is purely a matter of terminology, since ACMI has represented cotton, man-made fiber and silk segments of the U. S. textile industry since 1958.

Most anybody can play cards, but it takes a cannibal to throw up a hand. (Ug!)

* * * * *

One friend said to another, "Say, how did you get that scar across the bridge of your nose?"
"From glasses."
"Well why don't you get contact lenses?"
"They don't hold enough beer."

* * * * *

Didja hear 'bout the guy who tried to cross a monkey with a rabbit?"
No, I didn't—what did he get?"
"A cross rabbit and a very tired monkey!"

New Faculty Member

By D. V. Rippy, TM '64

Dr. J. J. Porter

Dr. John Jefferson Porter is the newest addition to the Textile Chemistry faculty. He came to Clemson in January of 1962 at which time he taught a graduate course in cellulose. He began teaching undergraduate courses in September, 1962.

Dr. Porter is from Atlanta, Georgia, where he attended Georgia Tech. In 1956 he received a B.S. in Chemical Engineering and in 1960 he received a Ph.D. in Organic Chemistry from Tech.

After getting his Ph.D. and prior to coming to Clemson, Dr. Porter worked in textile research for the American Cyanamide Co. He is doing some research here at Clemson in new dye systems and cross linking agents for cotton. This research work is one of his main interests.

Dr. Porter and his wife Patricia, formerly of Maryville, Tennessee, have one son, John Jr., who is 28 months old.

Index to Advertisers

☆

Special

TEXTILE DICTIONARY

for <u>BEST RESULTS</u>

in Textile Processing

C

Corobex (Kôr 'a-bex)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors of bacterial origin.

Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

D

Discolite[1] (dĭs ′ kō · līte)

Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

Dispersall (dĭs · pûr ′ sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing.

Used widely as a dispersing agent in dyeing synthetic fibers with disperse colors and for fast color salts and bases in Napthol dyeing and printing.

Effective in stripping to prevent redeposition of the color on stripped goods.

N

Neofinish (Ne/.O.Finish)

Non-Ionic softener dispersible in hot water, suitable for all textile fibres, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

Neowet (nē ′ ō · wĕt)

Complex Polyethelene Ether in the form of a pale yellow, slightly viscous liquid.

A non-ionic surface active wetting agent, effective at all temperatures. Completely compatible with enzymatic desizing agents and readily soluble in water. Contains 33 1/3% active ingredients. Widely used in scouring all types of textile fabrics and for general wetting purposes.

Neowet X (nē ′ ō · wĕt)

Organic Ether Sulphonate in the form of a water white slightly viscous liquid.

An anionic surface active wetting agent, effective at all temperatures. Does not affect enzyme activity in desizing. Compatible with hydrogen peroxide and resin finishes. High detergent value. Contains 20% active ingredients.

Neozymes[1] (nē ′ ō · zīms)

Desizing agents made up of amylolytic, proteolytic and fat splitting enzymes available in the form of crystalline powder or liquid concentrate for high or low temperature requirements.

Neozymes quickly remove all trace of starch glue or gelatin sizing without danger of damage to even the most delicate fabrics. For best results, use with NEOWET to speed saturation.

P

Parolite[2] (păr ′ ō · līte)

Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics.

Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

V

Vatrolite[5] (văt ′ rō · līte)

Concentrated sodium hydrosulphite in the form of white crystalline powder. A powerful reducing agent for vat colors, ideal for dry feeding because of its free flowing, dustless character. Completely soluble in water.

Effective stripping agent for direct, sulphur and vat colors on cellulosic fabrics.

Quickly removes rust stains from cotton goods.

May be stored indefinitely.

Available with optical whites and in buffered formulas for high temperature use without excessive alkalinity.

Velvo Softener (vel ′ vō)

A highly sulphonated tallow in the form of a creamy white paste, easily dispersed in water. Used in general finishing of all types of textile fabrics. Will not "smoke off" or change color in high temperature operations such as calendering or drying. Has no effect on light fastness of colors.

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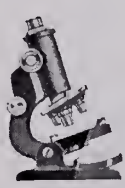

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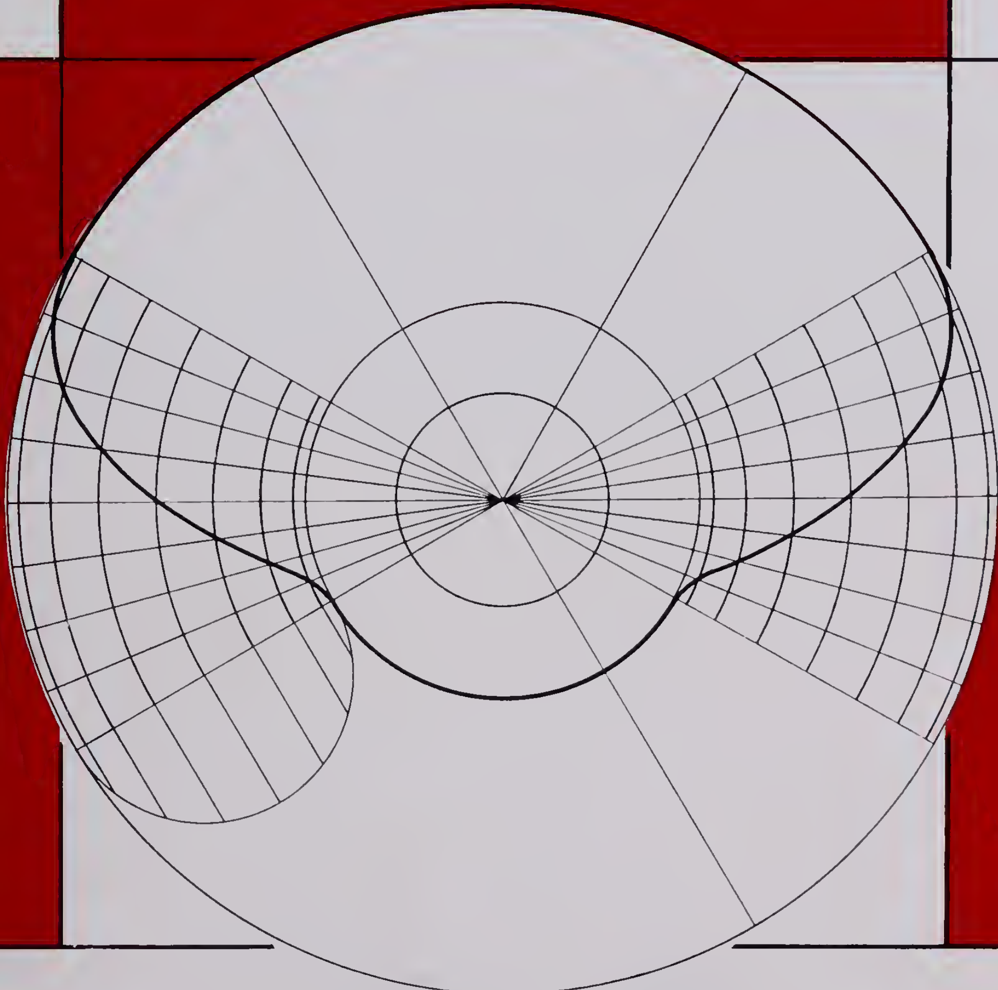

WINTER '63

CLEMSON

bobbin and beaker

THE

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

from the Editor

This issue of the BOBBIN AND BEAKER is centered around an excellent article on "Warp Preparation—An Art and a Science." This was a speech given by the author, Mr. John C. Bodansky, at the Sixth Annual Seminar at Queens University in Kingston, Ontario. We are grateful to Mr. John C. Bodansky and Mr. John M. Merriman, Editor of the Canadian Textile Journal, for granting permission to the staff to reprint this article.

Also, we urge all of our readers to take special note of Dean Gaston Gage's contribution to this issue. This matter is most urgent to the Textile Industry as a whole. Along the same line is an article by Mr. Ralph J. Bachenheimer. As you read these two contributions, keep in mind a quote by Dean Gage: You can "help yourself by helping us."

The staff and I hope that you will enjoy reading this issue.

Seated left to right: C. E. Crocker, Jr., Business Manager; R. R. Sarratt, Circulation Manager; R. W. Ellis, Advertising Manager; J. W. Blackwood, Managing Editor. Standing: W. E. Barrineau, Jr., Editor.

Warp Preparation—An Art and a Science

JOHN C. BODANSKY
(Cocker Machine and Foundry Company)

In discussing warp precaution as it is today, or may be in the future, it might be helpful to look back into history a short time and see what changes have taken place in both warping and slashing. This might give us a better idea of why we do things the way they are done now.

Some of you must remember the days of spool warping. Yarn was wound from the spinning bobbin to a wooden spool having wooden heads. The machine for this was the spooler. The process was slow and tiresome. It required considerable help (usually women), and the package produced was anything but satisfactory. The spools usually held less than a pound of yarn, and were of uneven lengths and poorly wound. Slub catchers were unknown and little or no attempt was made to control the quality of the yarn on the finished spools.

This process required an enormous number of spools which were tossed around and became battered and damaged. Large bins were required to store both empty and full spools. Every mill had quite a problem keeping track of, and controlling, their inventory of yarn on spools.

The full spools would be stored or taken directly to the warper creel. This creel was known as a 'V' creel, or spool creel. Skewers were put through the bore of the spool and it was placed in the steps of the creel. The older spool creels did not have any stop motion, so if an end broke or a spool ran out, a mechanical stop motion was supposed to stop the warper head. Sometimes it did, and sometimes it did not. Later, drop wires were placed on the uprights of the creel near the spools. These drop wires were electrically connected through a lamp bank to a knock-off box on the warper. At the time, it was supposed that the lamp bank would reduce the voltage across the drop wires. Of course it did not as long as the drop wires did not fall, and you could receive a good jolt if you put your fingers across the drop wires.

After the drop wires with lamp bank, the next big step was the use of the transformer which actually did reduce the voltage across the drop wires. The knock off box was still unsatisfactory because the coil in the box was not strong enough to insure releasing the latch every time.

BIOGRAPHICAL NOTES

John C. Bodansky was born in Narbeth, Pennsylvania, on March 16, 1907. Moved to Atlantic City, New Jersey, in 1919 and in 1920 entered Atlantic City High School. Graduated from Drexel Institute in 1928 with degree of B.S. in E.E. Moved to the South in 1928 and worked for three months for Cocker Machine and Foundry Company in the Drafting Room. Left Cocker Machine and Foundry in 1928 and went with Duke Power Company out of Charlotte, N. C. Stayed with Duke Power Company until 1936 and when he left Duke Power Company he was in the Instrument Engineering Division. Mr. Bodansky went with Cocker Machine and Foundry Company in 1936 as an erector and worked until 1938. From 1938 until the present he was on the Sales Force. He is now Vice-President and Treasurer and Finance Officer of Cocker Machine and Foundry Company.

The most modern mills some 30 years ago were running warpers and spool creels at a speed of about 60 yards per minute. Higher speeds were impossible because it was necessary to unroll the yarn from the spools. When the warper stopped, the spools would continue to revolve and dump yarn. Even at 60 yards per minute, it was necessary to equip the warpers with rise rollers to take up the slack.

OVER END WARPING

The biggest step forward came with the move to over end warping Creel packages were made the same as they are now; either cones or cheeses. These opened the way to what seemed to be almost unlimited speed, because there was practically no inertia in-

volved, and, as a result, no strain on the yarn when starting, or over-travel of spools when stopping. Warpers could be driven directly by individual motors, starting directly across the line, and stopped suddenly by electric brakes. In the case of the cone creel, transfer tails could be provided and it was not necessary to stop when a package was emptied. Electric stop motions could be used in conjunction with the electric brakes, and the warper would stop in a few yards. Speeds of 300 to 400 yards per minute were the order of the day.

Since the cone creel would be magazined and the cheese creel had larger packages, beam heads grew in diameter from 24 to 28, and finally to 30 inches.

HIGH SPEED WARPER

The advent of the high speed warper did not solve any more mill problems than it created. The users of high speed warping equipment soon learned that yarn quality had to be improved greatly. The yarn of the slow speed days would not run properly on high speed equipment. This meant going all the way back to the cards to improve the quality of the yarn. Many a mill man found out that the cost of his high speed warper was a small part of the expense connected with his changeover. Of course, he also found that all the conpensation from high speed warping did not come from the warper room. The necessary improvement in the yarn reflected all through the mill. Better section beam were produced; better slasher operation resulted and higher weaving efficiencies were obtained. On top of all this, the mill produced a better quality cloth.

The first of the high speed warper were all drum or traction driven. That is the drum action against the warp actually drove or rotated the beam. This resulted in slight slippage between the warp and the drum in both starting and stopping. This slippage was more pronounced in stopping since the stopping had to occur more quickly than the starting.

Continuous filament rayon was being run on this same equipment, and it was soon obvious that it was unsatisfactory. The slippage between the warp and drum was damaging the yarn extensively. The situation was serious because it resulted in broken filaments. Broken filaments are a menace to the slasher room and the weave shed, and at the time it seemed that the only solution was to slow the warper down. As a result, speeds on continuous filament yarn dropped to the neighbourhood of 120 yards per minute. This meant more warpers and creels, and, as a result, more floor space. It also meant an increase in personnel.

This condition soon brought about the development of the spindle driven warper for filament. The first of these was equipped with mechanical variable

(Continued on next page)

speed transmissions which would keep the yarn speed approximately constant by gradually decreasing the RPM of the beam as the diameter increased. These drives had a limited range and would only take care of speed adjustment necessary for beam build up. No real adjustment in operating speed was available without changing a motor sheave.

VARIABLE SPEED DRIVES

The electrical manufacturers were quick to see that here was a place for a variable speed electrical drive, and the packaged DC drive was given the job. This drive had a much wider range than the mechanical variable speed drive; therefore, changes in yarn speed could be obtained without changing sheaves. This was a great help since it was soon discovered that different yarns operated more efficiently at different speeds.

It was also known that varying mill conditions, such as humidity, will change the speed at which a given yarn will run most efficiently. After all, maximum speed of the warper would not give maximum net production. Maximum net production may come from a high or low speed.

The cotton mills watched the introduction of the spindle driven warper to the filament industry, but since cotton yarn had no filaments to break and was a fuzzy yarn, anyway, it was thought that this warper was for filament only.

As the tendency towards higher and higer speeds developed in the cotton industry, it became apparent that skidding or slippage could be dangerous even on cotton, and soon some cotton mills turned to the spindle driven warper.

SPINDLE DRIVEN WARPER

The increase in warping speeds also brought about another change. Mills noticed, of course, that with increased speed they were doffing more often. As a result, the percentage of down time increased, thus lowering the warping efficiency. The only logical answer was increased beam size. Diameters went from 30 to 32", and eventually to 40". Of course, the beams were much heavier and were running faster, so the dangers from skidding or slippage became more apparent, and the need for a spindle driven warper became more obvious. The spindle driven warper now permits a 1000 yards per minute speed on 36 or 40" diameter beams, and the only limit seems to be the amount the mill is willing to invest in warping machinery.

The modern spindle driven high speed warpers are powered by DC drives ranging from 5 to 15 H.P. Many of the tricot warpers employ 5 H.P. drives because the yarn is usually low denier yarns and speeds do not exceed about 500 yards per minute. There are also several 15 H.P. drives in use. These are usually found on machines running heavy denier viscose tire yarn or on carpet yarns where tensions run as high as 125 grams per end.

In order to select the proper drive for a warper, one should know the maximum and minimum speeds required; the number of ends to be operated and the tensions to be encountered. It is important to know the minimum speed and yarn tension because the developed H.P. of a DC drive falls off with the drop from rated or full speed of the motor. As a result, it is sometimes necessary to use a motor larger than would be necessary if the drive were to be operated somewhere near the rated speed at all times. Of course, an intermittent duty crawl or jog speed is always available but this can not be used for continuous duty.

Two types of speed control are favoured for these machines. One type feeds an indication of presser roll RPM to a mechanical differential. An indication of the required operating speed is fed to the other side of the differential by a small DC motor. If both speeds are indentical, the output shaft of the differential will not turn, but can be made to position a rheostat which controls the speed of the main motor. This permits speed adjustment, as well as speed control. Speed adjustment is accomplished by using a variable speed input or pilot motor. The other control device consists of an electric tachometer generator driven by the presser roll. This feeds a signal to what might be termed an electrical differential. The other side of the electrical differential is fed by a constant voltage source. A difference in the two voltages can be made to correct the speed of the main drive. Here again we can obtain adjustable speed, as well as accurate constant speed.

As previously noted, beam diameters have been increasing, which, of course, means that the weight of the full beam has greatly increased, and 1400 pound beams are not unusual. Obviously, this has created a

handling problem and now most spindle driven warpers are equipped with some means to assist in doffing. This is usually an air operated mechanism or an electrically operated mechanism. The purpose of these mechanisms is to lay the full beam on the floor or a dolly, and to pick up the empty without the tender having to break his back cranking them up and down.

Another more recent development on the warper has been the traversing mechanism for the comb. This has been found necessary whenever a low number of ends is involved. The traversing mechanism prevents the build up of ridges and valleys in the warp. In some cases, it is necessary to provide an adjustable traverse. It is even possible to obtain a traverse which is adjustable in both amplitude and frequency.

CHANGES IN CREEL

During the progress toward higher speeds and larger packages, changes took place in the creel. These changes quite naturally involved the package holders for both the cheese and cone creels. Holders had to be designed to permit over-end operation. In the case of the magazine cone creel, the package holders had to permit tying the tail of one package to the start of the other.

Tensions had to be designed to operate with the magazine cone creel. The first of these was the dead weight-washer type. This was, and still is, used on both cotton and continuous filament yarns. The first washer tensions were crude but satisfactory because speeds were not too high. As speed increased, the washer tension was refined. The post was changed from porcelain coated cast iron to hard chrome plated steel. The first washers were plain stampings but later these were ground to a flat surface and hard chrome plated. Today's washers are precision made and present an extremely flat surface to the yarn. Chrome plated steel posts are still used on cotton, but most of the filament industry has changed to ceramic posts.

Many other type tensions have been tried, but none are so universally used as the washer tension in one form or the other.

The increase in speed of the warper brought ballooning problems to the creel. This problem is especially noticeable on coarse yarn. As a result, balloon breakers had to be devised. These usually take the form of a barrier of some sort stretched between the horizontal rows in the creel. In the cotton creel, this is usually two parallel rows of spinning tape between each horizontal row of cones. In the continuous filament creel, it consists of several rows of stainless steel wire between each horizontal row of cones.

Stop motions have also improved with time, and the newest ones are fast and positive. They may be

(Continued on next page)

either the mercury contact type or the electronic type. In either case, positive action is assured regardless of lint conditions.

DEVELOPMENTS IN SLASHING

The development and advances in slashing have more or less paralleled those in warping. Of course, cotton system slashing is basically the same as it was 20 to 30 years ago, so far as the system itself is concerned, but the machinery for operation of this system has changed.

As we all probably know, cotton system slashing is simply a collection of section beams from the warper in order to pass the complete warp sheet through the sizing medium and through a drier to the loom beam wind up. The drier has been either hot air or cylinder type for a good many years.

The old cotton system slasher consisted of a cast iron beam creel with cast iron bearings, a copper size box with copper bottom quetsch rolls and felt covered cast iron top rolls. The top rolls did not run in bearings and were not equipped with any weighting mechanism.

The drying section consisted of two (2) large diameter copper cylinders, good for about 12 PSI steam pressure. The head had a very simple set of delivery rolls in cast iron bearings, and driven by cone pulleys. The beam drive was by a very unsatisfactory friction. Quite often the cylinders were not driven but were pulled by the yarn. In any case, it was necessary to change gears to change stretch. Quite often it was impossible to change stretch.

The rayon people again influenced the cotton people. The rayon manufacturers went to the cotton system for continuous filament yarns as soon as it was feasible; that is, as soon as the warp lengths were sufficient to warrant cotton system, but the continuous filament people chose the multiple cylinder slasher, consisting of five, seven or nine, and even eleven 23" diameter cylinders. These were later changed to 30" diameter cylinders.

MULTIPLE CYLINDER SLASHER

After several years of operation in this manner, the cotton manufacturers saw the advantages of the multiple cylinder slasher, and they now have changed largely to the multiple cylinder slasher. Off and on during this period there were excursions into the hot air drying systems, and many of these are still in operation.

The change to the multiple cylinder slasher permitted the cotton manufacturers to increase speeds of slashing because these smaller cylinders could be built to operate on higher steam pressures than the large cylinders. This permitted raising the temperatures of the cylinders, thus increasing the speed of the machines.

Since the section beams were becoming larger all the time, the loom beams grew in size, and now practically all slashers will take a 32" diameter flange on the head of the machine. Many of the beam creels now accommodate 40" section beams and speeds have increased from 20 yards per minute to 175 yards per minute.

In the case of the slasher, the limiting factor is not only drying capacity, but the operation of the section beams in the beam creel. At high speeds, these beams, quite naturally, have a tendency to overtravel when the machine is stopped.

Here, again, we have the problem of stopping rather than the problem of starting, and it would appear that both warping and slashing stopping is the biggest problem.

THE BEAM CREEL

Since we realize that package sizes and speeds are increasing, let us examine just what is required of a good slasher and since the yarn enters from the beam creel, let us start there.

The beam creel must be a ball bearing creel for operation at high speed. It must provide a means for the operator to adjust and align the beams properly.

(Continued on page 16)

The Dean says...

The total enrollment in the textile curriculums at Clemson is a little more than it was last year—316 to 305 I believe. This slight increase is due to the number of students who changed to textiles after enrolling in other courses and found that these courses were not what they expected.

We were disappointed in the enrollment of entering freshmen. The number of these students was down from last year. During the spring and summer when young men were choosing careers the headline news in the papers indicated poor prospects for textiles. The papers were full of the two price cotton and import problems. Everyone seemed to read these headlines of doom.

What the young men and their parents missed entirely was the good news. Men who have accumulated millions of dollars to invest do not throw it away on a dead industry. During this time when I heard a state senator say the textile industry was a dieing industry and the workers would have to be trained in other skills to enable them to make a living, the following was taking place:

1. Stevens was doubling the capacity of Delta finishing and expanding Utica Mohawk to more than 20 acres of floor space.
2. Woodside Mill was starting to build a twelve million dollar plant at Fountain Inn.
3. Springs was planning two plants and building a tremendous cotton warehouse at Fort Lawn.
4. Inman Mills was completing a new plant at Inman.
5. Greenwood was completing two new plants at Ninety Six.
6. The McKissicks were building at Easley.

THE DEAN SAYS . . .

7. Allied Chemical was building a nylon plant at Irmo.

8. Chemstrand was building and expanding at Greenwood.

9. Everybody was buying new equipment.

This could be expanded but this list makes my point.

One thing that is often overlooked is the production of man made fiber in South Carolina. The value of the man made fiber crop in this state is about five times the value of the cotton crop and about eighty percent of the sale value of all agricultural crops—peaches, cotton, tobacco, lumber and pulp wood, livestock, etc. And this is in the raw state, not woven into a fabric.

We are tremendously proud of the success of our graduates in this great textile industry. A news item last week told of the incorporation of Pacolet Industries, Inc., a group of Milliken mills. Of the seven officers listed in the news item, four—including the president—were our graduates. One other was from N. C. State. Three separate news items two weeks before listed promotions to a division general manager for Stevens, a vice president and general manager for Abney and a plant manager for Woodside. All were Clemson graduates. In a recent series of promotions at Springs I believe they were all our graduates.

I could go on with other examples. Suffice it to say that the manufacturing plants of the textile industry of South Carolina are largely being managed by textile school graduates. And South Carolina has close to forty percent of the spindles in the United States and about half the finishing capacity. Naturally most of them are home state boys from Clemson.

In New York the selling houses are looking for textile school graduates. In the middle west, speciality manufacturers are looking for textile school graduates. We can not turn out these graduates unless we have students entering.

Help yourself by helping us.

Outstanding Seniors . . .

By
Henry M. Poston, T.M. '65


Robert W. Ellis

Robert W. Ellis is a twenty-one year old Textile Chemistry major from Huntersville, North Carolina. To aid with his college expenses he received a Lowenstein Foundation Scholarship. He has received honors for two semesters of his college career.

While at Clemson, Robert has been an active member of Blue Key, Phi Psi, arnold Air Society, YMCA Council, Delta Kappa Alpha, AATCC, Student Senate. He edited the Blue Key Directory and is presently serving as Advertising Manager of the Bobbin and Beaker.

For the past two summers Robert has been employed by Thermo Plastics Corporation. After graduation he plans to either enter the Air Force Institute of Technology or attend Graduate school here.

Clyde E. (Gene) Crocker, Jr., a twenty-one year old Enoree, South Carolina, native is a Textile Chemistry major. He has received an Inman - Riverdale scholarship to help finance his expenses at Clemson.


Clyde E. (Gene) Crocker, Jr.

Gene has been kept busy by participating in several campus activities; these include: Phi Psi, Blue Key, YMCA, YAF, AATCC, High Court, Wesley Foundation, Student Senate and International Students Association. He has received honors for two semesters, listed in Who's Who, served as student body chaplain last year, and is a Distinguished AFROTC cadet.

Gene has gained valuable experience in the textile industry for the past four summers when he was employed by the Riverdale Mills in Enoree. Upon graduation he plans to enter the Air Force for four years.

Twenty-one year old Robert R. Sarratt is a Textile Science major from Gaffney, South Carolina.

Robert has been an active member of AATT and Phi Psi. During his Sophomore year he was a member of the Pershing Rifles. He is presently a member of the Hall Counselors Association, a Distinguished Military Student, and circulation manager of Bobbin and Beaker.

Last summer, Robert gained first-hand experience in the textile industry when he was employed by Pacolet Manufacturing Company in Pacolet Mills, South Carolina.

After graduation Robert plans to attend Graduate School, but at the present time he is still undecided on the institution.


Robert R. Sarratt

American Association for Textile Technology Inc. News

By

Spurgeon B. Brian, Secretary, TS '63

Three big events have taken place this fall in the student chapter of American Association for Textile Technology, Inc. They were a big trip, a plaque contest amoung the pledges, and a joint meeting and supper with the Piedmont Chapter of A. A. T. T.

The field trip, attended by 26 members, was to the Deering Milliken Research Center in Spartanburg and to Saco-Lowell Shops in Easley. We toured the Deering Milliken Reseach Center during the morning of November 22, 1962. At noon, Deering Milliken treated us to a very nice luncheon. During the afternoon we toured the Saco-Lowell Shops. Everyone was impressed with the safety regulations at Saco-Lowell. We were all required to put on safety glasses before going into the machine shop.

Fifteen pledges entered their plaques in the plaque contest, November 27, 1962. The winner was Henry M. Poston.

The A.A.T.T. banquet and joint meeting with the Piedmont Chapter was held on December 6, 1962, at the Clemson House. Twenty Piedmont members and three students attended. Mr. Gar Gilliam of Gaylor & Lord spoke on how he got ideas for new styles of fabrics. He brought some very beautiful pieces of cloth with him and showed these to us. One interested everyone especially because it was hand woven with metallic gold for extra filling floats.

The luncheon at Deering Milliken Research Center.

WARP PREPARATION

(Continued from page 16)

It must have a station from which the operator can control the whole operation of the slasher, and finally, it must have a means for retarding the beam when the slasher is slowed down or stopped. Practically all new beam creels have all of these features; however, the last feature unfortunately consists of a drag rope on most creels. With speeds of 150 yards per minute and above, this is not quite satisfactory, and other methods of retarding the beam are available, but are expensive. It may well be that if slasher speeds continue to increase, this expense can be justified.

THE SIZE BOX

The next element of the slasher is the size box. For many years this has been equipped with two sets of quetsch rolls for spun yarns and one set for filament. The size boxes now have stainless steel pans and fittings; stainless steel bottom rolls, and rubber covered top rolls with no slasher blankets. A good size box section must have a good size level control, as well as a good size temperature control. The heating equipment for cotton should be a three element perforated stainless steel heating pipe. The filament box should have a steam jacket for use on gelatin and low temperature sizes. Since many chemical sizes, such as Orthocryl are being used, all parts which come in contact with the liquid must be able to resist chemical action. This includes the bearings of the immersion roll, and since no stainless steel ball bearings exist, that will resist these chemicals, nylon bearings are now being used.

The size box is the place to control the quality of the sizing. It is not only necessary to coat the yarn with size, but it is necessary to penerate to some degree in order to help bond the size to the yarn. On very heavy warps, it is sometimes impossible to get sufficient penetration or coating on all warp ends with one box. In this case, it is necessary to use two boxes and pass half the warp sheet through each box.

The new boxes (both double and single), when equipped with the proper rubber rolls, go a long way towards providing adjustment and control of both pick-up and penetration. Of course, most mills have no way of determining the amount of penetration they are getting except by observing the amount of shedding. Pick-up, of course, can be easily determined by weighing the yarn.

The size box should be equipped with a variable speed drive which will permit speed adjustment and, as a result, tension adjustment between the box and the drying section. Of course, this can only be done on a cylinder type drier. This control can be a motor from a multi-motor drive, or a mechanical variable speed.

The drying section will determine the speed at which the machine will run. Fifty PSI cylinders will permit high temperatures, and faster drying. We know that if we can obtain close to 280 degrees Fahrenheit drying temperature, we can produce about 1600 pounds of dry warp per hour. Here is the determination of slasher speed. On certain heavy warps, this may only mean 80 or 90 yards per minute. On other light sets, such as 80's square, this would mean over 200 yards per minute. From this you can see that in determining slasher production, it is necessary to first find out how fast you are willing to operate and then be guided by this maximum speed.

In all mulitple cylinder type slashers, at least the first three cylinders should be teflon coated. Sufficiently large steam entrances to the cylinders should be provided and all cylinders operating at pressures above 15 PSI should have the ASME code mark and certificate of inspection should be furnished.

Temperature controls are quite widely used on spun yarn, although some mills operate with pressure regulation only, and depend on a moisture content controller. All filament slashers should at least have group type automatic recording temperature controls, and individual controls are preferable.

Chain and sprocket drives are the most common for multiple cylinder slashers, although gear drives are available. In either case, the drive should be heavy enough for high speed on light spuns or high tensions on heavy continuous filament warps.

In all cases, when spun yarns are run, a hood is a must. It is impossible to get maximum efficiency from the drying section unless the heavy moisture laden air is removed from the cylinder section and size box rapidly.

The cylinder section should also be driven by a variable speed drive in order to permit adjustment of tension between the drying section and the delivery rolls. Again this can be mechanical or electrical.

The head end is simply a means for winding a loom beam and although this sounds simple, it is not. The head is equipped with a three roll set of calender or delivery rolls. These deliver yarn to the loom beam. The loom beam is rotated by some device which will try to make it tend to run faster than the rate of delivery from the calender rolls. The loom beam drive must do this regardless of slasher speed. It must do this at a crawl speed of about 4 yards per minute or an operating speed of well over 100 yards per minute. It must continue to do this while the slasher is ac-

celerating or decelerating. The old method was the slasher friction. This was a very unsatisfactory operation because the variation in beam diameter caused a variation in slip, and a resultant variation in tension. The multi-motor drive does the job nicely, although controlled friction is available which will also do a very good job.

CONTROLLED FRICTION

This controlled friction is actually a small friction placed on the input shaft of a mechanical variable speed transmission. Speed indications are taken from the constant side of the friction and the slip side friction, and fed into a mechanical differential. Any slip above a predetermined amount changes the mechanical variable speed. As a result, the RPM of the beam speed is kept in the proper relation to the diameter of the beam, and the percent slip in the friction is constant. This results in a theoretically constant tension on the warp. Changes in tension can be accomplished by changes of pressure on the friction plates.

The beaming head, of course, should be equipped with a good comb and split rods. Convenient controls should be placed on the head, and all spun yarn slashers should have ironing compressors. The air operated compressors are preferable.

On wide beaming heads for heavy warps, one should be sure that the top calender rolls are heavy enough to withstand the strain imposed by the warp without deflecting.

The new beaming heads permit quick removal of the full warp and quick replacement with an empty beam. This is very important in view of the high speeds at which we now operate.

Since slashers are now operating at much higher speeds, a situation similar to that which developed through high speed warping has been encountered. This is the drop off in efficiency due to more frequent doffing and a greater loss during doffing time. This has been partially overcome by increasing beam size, but still another means is available for increasing slasher efficiency. This is the double beam creel. This consists of two beam creels mounted on tracks. One may be loaded while the other is in operation. As a result of this double beam creel, I have seen slasher efficiencies of 72% when using 30" beams at 125 yards per minute.

OPTIONAL FEATURES

In addition to the necessities previously mentioned, there are many optional features which assist in making better warps or improving slasher efficiency.

The moisture content controller permits operating at maximum speed for maximum temperature without the danger of either overdrying or under drying the yarn.

Pneumatic loading of the rubber rolls in the size box makes it simple to apply exactly the right pressure for the required pick up at maximum speed. A control can also be applied to this loading equipment which will help keep correct pick up when the slasher speed is reduced to crawl.

For continuous filament yarn, we now have an oiling or waxing device which can be placed on the head of the machine. Stretch has long been a problem in slashing, and stretch indicators, or determinators, are now available.

For the mill that uses cut marks, a new cut marker is available. This cut marker can be set to mark any cut length from 3" to 140 yards without any change of gears.

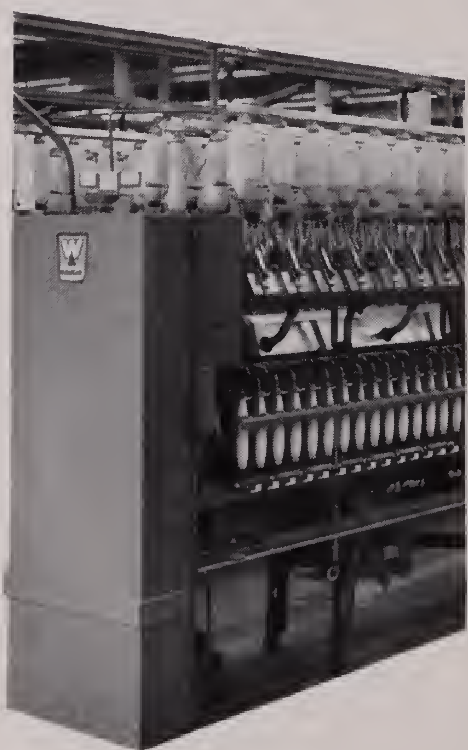
Previously, we mentioned multi-motor and controlled friction slasher drives. Although the beam drive in the controlled friction drive is mechanical, the main motor drive is usually a DC motor generator. In applying either of these drives, it is necessary to select the proper H.P. This can be done only if all operating conditions are known. Maximum speed must be known and maximum tension must be known. With this information, the proper H.P. can be calculated, and minimum operating speed determined. In general, the higher the maximum speed, the higher the allowable minimum. This applies to both types of drive.

SUMMARY

I have tried to cover both warping and slashing old style, and new style, but since warp preparation is affected by so many variables; hours, or even days, could be spent on the problems encountered in both processes. Humidity, speed and tension are all tied together in warping. All affect each other. Speed, drying temperature, size viscosity, size formula, size temperature, squeeze roll density and many other factors affect slasher operation, and all of these affect each other.

From all of this, you can see that, although warp preparation seems simple enough, it can become very complicated, and I only hope that I have been able to point out some of the things necessary to good warp preparation.

Wherever man turns fibers into yarn..



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The W. F. Fancourt Memorial Seminar . . .

By

Harold Turner, TM '63

On October 4th and 5th, four Clemson College students and Mr. T. D. Efland, attended the first annual W. F. Fancourt Memorial Seminar in Greensboro, N. C. About 100 college students attended, representing nine colleges from the Carolinas. Attending the Seminar from Clemson were Mr. T. D. Efland, Spurgeon Brian, Frank McGee, Ben Smith, Jr., and Harold Turner.

Walter F. Fancourt, Jr., was the founder and the first president of the W. F. Fancourt Company. Throughout his 50-year tenure as head of the company until his death in 1954, he maintained an eagerness to "keep the business going" by urging that industry adopt a closer kinship with the textile schools and their students who would later provide the technological advances and leadership on which the textile world would grow.

Following his father's interest in young people, and as a tribute to his father and brother, John L. Fancourt, second son of W. F. Fancourt Jr., instituted the first W. F. Fancourt Memorial Seminar. The primary aim of the seminar was to bring industry and education together in an informal atmosphere to discuss the future of textiles, and to give the students a good working knowledge of some of the problems—and the progress—of the industry and may help to decide direction of future careers.

The seminars lasted two days, keeping the students in a trot to meet the busy schedule. Discussions and lectures were given by very prominent men in textiles, such as: C. Norris Rabold, Director of Chemical Research and Development, Erwin Mills, Inc; J. V. Brice, Superintendent of the Renfrew Bleacheries, Division of Abney Mills; John W. Birkhead, Jr., Superintendent, Dyeing Department, Acme-McCrary Corp.; Steven A. Bundy, Head of Quality Control, Research and Development, Burlington Hosiery Co,; George G. Gallico, Vice-President, Chadbourn Gothan Inc.: Roy Reubel, Merchandising Manager, J. P. Stevens Co.; James Gibson, Vice-President of Manufacturing Services, Hanes Hosiery Mills Co.; and Robert J. Froeber, Executive Vice-President, Hanes Hosiery Mills Co. Their topics were mainly concerned with piece goods and hosiery. A question and answer period followed each lecture.

Highlighting the lectures series was Mr. George G. Gallico, Vice-President Chadbourn Gothan Inc. His topic was "Prelude to Marketing a New Product" which led to be runless seamless nylons.

The seminar dinner was held at the Sedgefield Country Club, and was addressed by Gordon Hanes, President, Hanes Hosiery Mills Co., and Archie K. Davis, Chairman of the Board, Wachovia Bank and Trust Company.

The first W. F. Fancourt Memorial Seminar was certainly a success, and it should be an annual affair that every Textile student should desire to attend.

Phi Psi News

by

Robert R. Sarratt, Secretary, T.S. '63

Fourteen new members have been initiated into Iota Chapter of Phi Psi Fraternity this fall. Three of the new members were honorary members and ten of them were regular pledges.

The three honorary members are Mr. James A. Chapman, President of Inman Mills; Mr. Robert M. Jones, Retired Vice President and Director of Research at Saco-Lowell Research and Development Center; and Mr. Joel L. Richardson, a professor in the Textile Management Department and faculty advisor to the student chapter of A. A. T. T. here. They were initiated on the evening of December 3, 1962, and were the guests at a banquet given in their honor at the Clemson House immediately afterwards. Dean Gaston Gage was the guest speaker and gave a very interesting talk on the opportunities for a young man in textiles. Also attending was Mr. C. E. Anderson, First Vice President of the Grand Council, who presided over the initiation ceremony.

Left to right: George Harmon, Mr. Chapman, Mr. Jones, Mr. Richardson, and Mr. Gentry, chapter advisor.

On November 23, 1962, the ten new pledges were brought into the Chapter. They are Donald F. Shirley, Douglas V. Rippy, William A. Suttle, Michael R. Prater, Jerry D. Burton, William T. Pack, Donald O. Pope, James E. Burch, Gary A. Hall, Jerry W. Blackwood, and Robert M. Holcombe.

Left to right: William Pack, Donald Pope, Michael Prater, Don Shirley, Bob Holcombe, George Hormon, Gary Hall, Jerry Blackwood, Doug Rippy, William Suttle, and James Burch.

TEXTILES: A Future Unlimited

By

Ralph J. Bachenheimer

Iselin-Jefferson Company, Inc.

and

Chairman of the Textile Section of the

New York Board of Trade

Few industries can offer greater challenges or higher awards than those available to capable young men entering the field of textiles. Opportunities are unlimited! Our industry is one of individuals and therefore the road to success is wide open for those who believe in the principle of free enterprise exercised by men dedicating themselves to the career they choose. There is no short cut nor a substitute for ingenuity, initiative and hard work, but for those who are willing to apply themselves thoroughly the proper awards are easy to achieve.

What the textile industry needs is a new generation of young men coming along grasping its opportunities at the widest possible scope. Few industries as large and as basic as ours have consistently shown returns on an investment as poor as the textile industry. Textiles today are selling at levels below those of ten years ago, while the rest of our economy has undergone a continued period of inflationary price increases. We need new management which has enough vision to realize that it takes more than cutting a price, or to underbid a competitor, to return stability and profitability to textiles. What we need, and need badly and quickly, is a new approach whereby we stop apologizing for our products but go out and promote forcibly the many new fabrics produced in our mills. New fibers and chemical finishes given fabrics, properties unheard of just a few years ago, and yet none of these have helped to increase the profitability of this industry of ours to a point where it can compare with other major producers in this country. Bold and imaginative selling, coupled with a willingness to attract a larger share of the consumer dollar from other industries can easily change the mistakes of the past and today.

Promotion, selling and merchandising have undergone vast changes during the past twenty years. These changes have benefited our economy at large. We hope that all of you who are spending years in college training to acquaint yourselves with these changes will learn how to apply them in your life work after graduation and help lead this industry, which is the life blood of the South, to a brighter and more glorious future.

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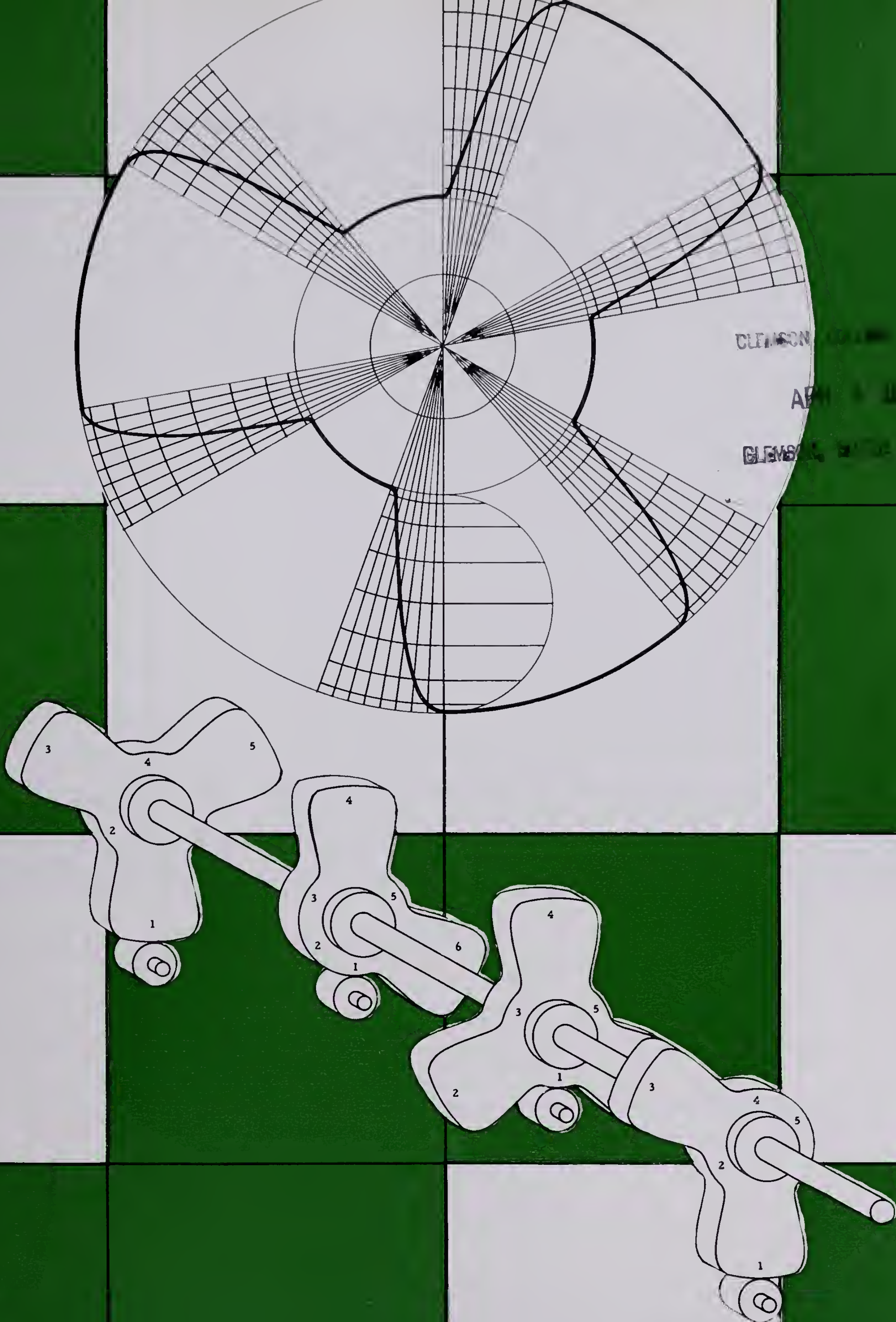

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In This Issue

The BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Industrial Management and Textile Science.

Address: The Bobbin and Beaker, School of Industrial Management and Textile Science, Clemson College, Clemson, South Carolina.

THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

In Memoriam

George M. Wright

from the Editor

This, the last issue by the Senior Staff, features an article concerning the scholarships that are available to deserving students in the Textile School.

We, the Senior Staff, have attempted to give something of interest to all of our readers — students, faculty, and textile men.

I want to thank all of our advertiser's who make this publication possible and the readers who patronize our advertisers.

The Junior Staff will now take over the magazine for the next four publications.

—W. E. B.

Seated left to right: C. E. Crocker, Jr., Business Manager; R. R. Sarratt, Circulation Manager; R. W. Ellis, Advertising Manager; J. W. Blackwood, Managing Editor. Standing: W. E. Barrineau, Jr., Editor.

TEXTILE SCHOLARSHIPS

By Gary A. Hall, T.S. '64

Starting in February any student, including incoming freshmen, majoring in Textiles at Clemson may apply for one of numerous scholarships that are awarded each year. There are approximately $8800 given out each year, plus $10,800.00 worth of scholarships that are given on a four year basis.

The recipients of these scholarships are chosen each year by a scholarship committee which is headed by Mr. E. A. LaRoche. Other members of this group are J. V. Walters, J. H. Marvin, and W. C. Edel. These professors have the very difficult task of choosing the student that they feel deserves the aid out of 35-40 applicants. Their action on requests for financial aid will be based primarily on scholastic record, eligibility to attend Clemson, financial resources, and date application is received by the Student Affairs Office. Eligible applicants will be considered for other scholarships that become available during the school year.

These scholarships are made available by various sources. These sources are composed of textile firms. business organizations and memorial funds. The donors make it clear to the recipients that they are obligated in no way by receiving one of their scholarships. These organizations are helping the textile industry as a whole, while, at the same time, they are spreading the good name of their organizations. The generosity of these groups makes it possible for many good men to enter the textile industry with a college degree.

These funds are divided into two categories. Some of the organizations give their scholarships on a four year basis. If the student maintains satisfactory grades, he will keep the scholarship for four years, but if he fails to meet the requirements of the selection board from semester to semester, the board will not hesitate in taking his aid away.

J. P. Stevens, The South Carolina Textile Manufacturers Association and the Lowenstein Foundation all give scholarships on the four year basis. If the student progress is unsatisfactory, J. P. Stevens and the S.C.T.M.A. will allow the Scholarship Committee to award the fund to another student, but Lowenstein will not permit the re-awarding of their scholarships to someone else. These scholarships are all given to incoming freshmen. Stevens and the S.C.T.M.A. give one to to a freshman annually and Lowenstein awards two each year.

Some of the donors prefer to give their scholarships on an annual basis. They will give a certain amount to a deserving student every year. These scholarships are made available to some applicant every year (unless otherwise specified.) Some are given to specific majors such as Textile Chemistry, etc. The student that held the scholarship the junior year is also eligible to apply for the aid again. There is no limit on the number of times he can receive the same scholarship.

The annual scholarships (some bi-annually) that are given are: Callaway Scholarship, Ciba Scholarship (T.C.), Geigy Chemical Company Scholarship (T.C.), Ben and Kitty Gossett Scholarship, David Jennings ('02) Memorial Scholarship (2), Keever Starch Company (SR), Owens-Corning Fiberglas Scholarship (Text. or Engr.), Seydel-Wooley Scholarship, Sonoco Scholarship (2), Carolina Yarn Association, and the Textile Overseers Association.

As afore mentioned, the choice of the students who receive these scholarships is a real task, but the records show that most of the boys who receive these scholarships have lived up to their expectations and are some of the outstanding students at Clemson. Present students who now hold these scholarships are:

J. P. Stevens Scholarship:

Robert R. Sarratt, Gaffney, S. C.—Sr.
Reggie L. Smith, Anderson, S. C.—Jr.
Bobby L. Waters, Calhoun Falls, S. C.—Soph.
Fred M. Hicklin, Richburg, S. C.—Fresh.

South Carolina Textile Manufacturers Association Scholarships:

Special one-semester:
Richard A. Hiles, Asheville, N. C.—Soph.
Tommie W. James, Sumter, S. C.—Fresh.

Richard R. Rice, Anderson, S. C.—Sr.
Ray T. Ivester, Newberry, S. C.—Fresh.

Leon Lowenstein Foundation Scholarships:

Robert W. Ellis, Huntersville, S. C.—Sr.
Donald O. Pope, Pageland, S. C.—Jr.
Douglas V. Rippy, Clinton, S. C.—Jr.
Edward T. Samulski, North August, S. C.—Soph.
Marshall White, Rock Hill, S. C.—Soph.
Larry T. Mills, Pageland, S. C.—Fresh.
Bruce R. Edwards, Tryon, N. C.—Fresh.

Wunda-Weve Scholarship:

Forest F. Dixon, Greer, S. C.—Sr.

Callaway Scholarship

Steven D. Tucker, Spartanburg, S. C.—Jr.

Ciba Scholarship:

Michael R. Prater, Seneca, S. C.—Jr.
Davis A. MacEwen, Greenville, S. C.—Sr.

Geigy Chemical Company Scholarship:

James N. Lindsay, Lanett, Alabama—Jr.

Ben and Kitty Gossett Scholarship:

Jerry D. Burton, Calhoun Falls, S. C.—Jr.

David Jennings ('02) Fund:

Bobby R. Dover, Lanford, S. C.—Soph.

Keever Starch Scholarship:

Donald F. Shirley, Cateechee, S. C.—Jr.

Owens-Corning Fiberglas Scholarship:

Leon J. Hendrix, McBee, S. C.—Sr.

Seydel-Wooley & Company Scholarship:

Robert M. Holcombe, Anderson, S. C.—Jr.

Sonoco Products Scholarships:

Russell H. Lawimore, Mullins, S. C.—Sr.
George L. Harmon, Chesterfield, S. C.—Sr.

EMPEROR'S FAVORITE FABRIC

Silk, symbol of quality and elegance for nearly five thousand years, has had its ups and downs, but now appears on the way back for another period of preference by discerning ladies.

Stories from New York and in the women's magazines indicate silk's popularity is rising, thanks largely to a new chemical treatment that rids of some of its basic faults.

It seems paradoxical that silk, the choice of emperors and the oldest fiber of fashion, should come from such humble beginning—a worm. But let's go back just a little.

Bombyx Mori is a medium-sized moth that adores silk and grows from the larva stage to adulthood while sleeping in a cocoon of pure silk. The larva, of course, is the silkworm, regardless of any fancy name. It is cream-colored and has a tremendous appetite for mulberry leaves. It so happens that mulberry leaves contain certain certain chemical components that furnish the raw material for silk.

The worm has a couple of glands that become gorged with a clear, viscous fluid which, when exposed to air, immediately hardens into a solid. The fluid is ejected through a spinneret and the larva turns his head constantly for about three days while the tiny filaments emerge, slowly forming a wrapping about its body. This wrapping, or cocoon, consists of a continuous thread of from 800 to 1,200 yards in length.

This is a fatal accomplishment, however, as the makers of silk kill the larva, put the cocoons in warm water and begin unwinding the silken threads, which are reeled into skeins. This is raw silk, and most of it comes from Japan and the Far East. A sizable amount is imported into the U. S. for dyeing, finishing and weaving. A little silk goes a long way. On a poundage basis, the consumption of silk is relatively small compared with heavier fibers.

Historians tell us silk has been made since 2640 B. C. There is a legend that during the reign of Chinese emperor Huang-Ti, an ambitious courtier picked up a cocoon and unreeled the thread. He thought even the emperor would be flattered by it. The courtier made some cloth and, with a low bow, presented it to the emperor. Sure enough, the emperor was flattered by it—so much that, by decree, only the emperor could wear silk clothing.

The Chinese guarded the secret of silk for many centuries before it finally spread to Korea and to Japan in the third century B. C. During the Christian era, silk became one of the most prized items of the Roman aristocracy. Its cost was tremendous, but trading expeditions were sent into the East with orders to bring back silk—or else. Later silk cultivation spread to parts of Italy and even to England during the reign of Henry IV.

King James I sent some silkworms to America in 1609. A small industry sprang up, mainly in South Carolina, Louisiana and Georgia. This grew haltingly and by the time of the Civil War the American silk industry was valued at only about six million dollars.

The growing of silk in this country faded, but the manufacture of fabrics from imported silk thrived to the extent that by 1919 this country was producing nearly $700 million worth of silk fabrics.

Then came the man-made fibers, and silk was displaced to a great extent.

But now comes a newly developed finish that solves some of silk's special problems—especially the stain problem—and makes silk easy to care for. It is claimed that this new chemical product gives silk not only resistance to stain, but improved washability, wrinkle and shrink resistance and new resiliency.

So, things are looking promising again for the favorite fabric of the emperors.

New Faculty Member

By Marshall White, Jr.
T. C. '65

D. R. Gentry

Mr. David Raymond Gentry is one of the newer additions to the faculty of the School of Industrial Management and Textile Science. He came to Clemson in January of 1960. Mr. Gentry is on the Textile Management faculty, and he teaches Physical Textile Testing.

Mr. Gentry is from Easley, S. C. He received his B.S. degree from Clemson in 1955, and in 1957 he received his M.S. degree from the Institute of Textile Technology in Charlottesville, Virginia.

Before becoming a member of the faculty of the Textile Department, Mr. Gentry worked for 2½ years for the research division of the Westpoint Manufacturing Co., West Point, Georgia. He is presently doing research in the field of physical textile testing here at Clemson. He also serves as faculty advisor for the Iota Chapter of Phi Psi Fraternity.

Mr. Gentry resides in Sunny Acres with his wife and two children.

Kotten Korner

Then there's the executive who is so old that when he chases his secretary around the desk, he can't remember why.

* * * * *

I heard you took out the gorgeous new receptionist last night," said one exec to another. "How was she?"

"Not so good," was the reply.

"Yeah," said the first exec, "you always were lucky."

* * * * *

The honeymoon couple was driving through Georgia but when they got to Aiken, they stopped.

* * * * *

A local distillery pays its overtime workers time-and-a-fifth.

* * * * *

One coffee bean to another: "I can be made instant, but I prefer the slow grind.

* * * * *

Clyde: "I've got a tricky cure for colds. You sit in a bathtub filled with gasoline and light two matches."

Clarence: "What's so tricky about that?"

Clyde: "Lighting the second match."

* * * * *

TV Commercial: "These wash-and-wear pajamas dry instantly, need no ironing, you can wash them at night and they'll be ready to put on in the morning."

* * * * *

Life Guard (with girl in his arms): "Sir, I've just resuscitated your daughter."

Father: "Then by gawd, you'll marry her."

* * * * *

A drunk staggered into a pub and asked for a double rye.

"Nope," said the bartender, "no drink for you. You can't even lift your head."

"Okay," said the drunk, "then gimme a haircut."

Where Are They Now?

The Bobbin & Beaker staff has made this survey on several Clemson grads majoring in Textile Manufacturing, Textile Engineering and Textile Chemistry. If there are any errors in the information below, please contact us.

CLASS OF '31

John B. League—TC—President of Industrial Products, Inc.—Greenville, South Carolina.

CLASS OF '48

Arthur C. Dorsey, Jr.—TE—J. P. Stevens & Co., Inc.,—Greer plant—Planning Overseer—Greer, South South Carolina

Joseph G. Connelly—TE—Shuford Mills, Inc.—Technical Service Supervisor—Hickory, N. C.

Charles T. Cockrell—TE—E. I. DuPont deNemours & Co.—Technical Service Representative—Wilmington, Delaware

CLASS OF '49

David E. Cowan—TM—Greenwood Mills—Cost Department—Greenwood, South Carolina

Luther P. Corley—TM—Corley Home & Auto Supply Co.—Owner-Manager—Lexington, N. C.

CLASS OF '51

Joseph A. Wyse—TM—Inman Mills—Director of Research—Inman, South Carolina

Charles R. Ulmer—TM—J. P. Stevens & Co., Inc.—Planning Department—Greensboro, North Carolina

CLASS OF '52

Walter G. Holmes—TE—Raeford Thorsted Corp.—Cost Supervisor—Clarksville, Virginia

Max Hinson Hance—TM—Burlington Industries—Sample Weaving Department—Greensboro, N. C.

James E. Aughtry—TM—Limestone Manufacturing Co.—Gaffney, South Carolina

CLASS OF '54

Harold L. Dantzler, Jr.—TE—Berkeley Mills, Inc.—Balfour, North Carolina

CLASS OF '56

John R. Swetenburg, Jr.—TE—Gainesville Mill—Gainesville, Georgia

William L. Polhemus—TC—The Dow Chemical Co.—Midland, Michigan

Capt. James C. Blandford—TM—U. S. A F—Sherman, Texas

CLASS OF '57

William T. Linton, Jr.—TM—Blue Bell, Inc.—Luray, Virginia

CLASS OF '58

Richard K. Hall—TM—J. P. Stevens & Co., Inc.—Overseer of Slashing and Drawing-In—Ninety Six, South Carolina

William L. Reed—TE—J. P. Stevens & Co.,—Plant #1—Great Falls, South Carolina

The Dean says . . .

(Professor H. B. Wilson is pinch-hitting for the Dean in this issue)

In February 1957, after being associated with the teaching profession in the School of Textiles for ten years, I accepted a new assignment which sounded exciting, challenging, and rewarding. This new assignment covered a number of duties—work to coordinate the industry's needs with the potential of Clemson Textile students in all educational matters; to help the industry encourage more and better students to fill the growing demand for college-trained textile personnel; to establish practical summer employment for Clemson textile students and to point up the industry's research needs that can be met by Clemson College.

The reasons for creating this job falls directly on the steady decline in enrollment at Clemson in the School Textiles. In 1949 there were 3,445 students enrolled in ten textile schools throughout the country. In 1958 the number had dropped to 1,679. As for the Clemson School of Textiles 830 students were enrolled in 1949 as compared with 269 in 1959. Today the textile enrollment is 325 and now that the school has combined with Industrial Management the total is 839 or the second largest school on the campus.

As of February 1, 1963 course preferences of new students on file for entrance in June and September 1963, as compared with February 1, 1962, are up 71.3%. We attribute this upswing to the fine work of the Clemson Liaison Committee. Recent favorable reports from the textile industry, better starting salaries for our graduates, and much work has been done by the various state foundations and associations in providing scholarships and generally attempting to promote interest on the part of high school graduates in textiles. Brochures have been prepared. In fact, A.T.M.I. provided a "Teachers Kit" for use in schools. Members of the School of Textiles and mill staff participated in career days and are always available for speech making to encourage young men to enter textiles as a career.

Textile men, without exception, agree that the textile industry must become more "glamorized" if it is to attract its fair share of college graduates. It is a well known fact that all existing industries, textiles appears to manage least of all, to stir professional enthusiasm. There seems to be a wide spread notion that the production of yarn and fabrics is pretty much a handicraft trade rather than a qualified industrial process. Only a few appear to know the highly developed technical level of up-to-date textile enterprises, the comprehensive requirements and opportunities offered.

The textile industry today is the leader in the use of electronic computers in scientific managerial techniques, quality control, methods and standards, costing, and inventory control. Automation today is being used and developed throughout the textile industry in all phases of operations.

Textiles On Wheels

Since Henry Ford introduced America to a steering wheel made of soybean oil, product research has played an important role in the automobile industry. Textile research developed super-strong cords for tires, long-wearing fan belts, tough and reliable brake linings, and luxurious but practical interiors.

Nearly every model change announced in Detroit incorporates findings of textile product research and suggests ways to increase the comfort, utility and safety of accessories for older models.

One such development, a knitted nylon slip-on seat cover, was introduced in January. Competing directly with non-textile products, the new seat covers are made of the latest type of stretch nylon with a locked corner seam to insure a snug fit. The washable fabric has been treated with a stain repeller to resist grease and oil spots. The covers are available in four colors and will be nationally distributed through auto accessory stores, department stores and supermarkets. Six types are available for two-door and four-door cars, fitting all models except those with bucket seats. They are in the same price range as terry-cloth seat covers—additional proof of the increasing values consumers find in textile products.

Another new development is an improved material for seat belts to reduce elongation (stretch) when the belt is subjected to the type of strain which might come if the car was involved in a wreck. The new material does not exceed 15 per cent elongation at 2,500 pounds static pull, while present government and Society of Automotive Engineers (SAE) specifications allow as much as 25 per cent elongation.

This reduction in stretch is a step toward greater safety, since the new webbing will hold belt users more securely. Other advantages in the new material include high degrees of resistance to abrasion, moisture, staining and soiling, plus ease of cleaning.

HELP!

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The Bobbin & Beaker,
School of Industrial Management
and Textile Science
Clemson College, Clemson, S. C.

Outstanding Seniors . . .

By Hank Baumann T.M. '65

WILLIAM E. BARRINEAU

William E. (Barry) Barrineau is a Textile Management major from Lake City, South Carolina. He is twenty years old and married. To help with his college expenses, Barry received the David Jennings ('02) Memorial Scholarship. He has received honors for two semesters and high honors one semester.

For the past three years Barry has been a member of the Bobbin and Beaker staff, and he is presently serving as Editor. Among the other campus organizations of which he is a member are the following: AATT, Phi Psi, SAM, NTMS, Council of Club Presidents, and the Student Senate. He is active in the Air Force ROTC program, presently holds the rank of lieutenant colonel. Barry is also a distinguished military student.

During summer vacations, Barry has gained valuable first-hand experience in the textile industry. This work experience includes one summer with Excelsior Mills of Rutherfordon, N. C. and one summer with Kingstree Manufacturing Co., of Kingstree, South Carolina.

DONALD F. SHIRLEY

Donald F. (Don) Shirley is a Textile Management major from Cateechee, South Carolina. He is twenty-six years old and is married. He has completed his military obligation by serving four years in the Navy.

To aid with his college expenses, Don received a Keever Starch Scholarship. He has received honors for two semesters while at Clemson. He is an active member of Phi Psi, the national textile honorary fraternity.

For the past several years Don has done part-time work for Woodside Mills in Cateechee. After graduation he plans to enter graduate school, but at the present time he is undecided on the institution.

Harold D. Turner, a twenty-one year old native of Inman, S. C., is a Textile Management major. He is married and is the proud "papa" of a six-week-old daughter, Lisa. An Inman-Riverside Foundation Scholarship has helped finance his four years at Clemson.

Harold has been kept busy while at Clemson with many extra curricular activities. Among these are Phi Psi, NTMS, SAM, Student Senate, Council of Club Presidents and Chairman of AATT. He has received honors for one semester.

Harold has gained first-hand experience in the textile industry by summer work at Inman Mills in Inman, S. C. Harold has accepted a position with Cannon Mills of Kannapolis, N. C.

HAROLD D. TURNER

Formulas For Practical Use

The following formulas are published in hope that they will provide an easily accessible reference for the textile student. They were obtained from the 1955-56 Fact File issue of TEXTILE WORLD and are reproduced with the permission of TEXTILE WORLD.

PICKERS

Breaker

$$\text{draft} = \frac{\text{surface speed of delivery (front calender) roll}}{\text{surface speed of feed roll}}$$

$$\frac{\text{rpm. of calender roll}}{\text{rpm. of feed roll}} = \frac{\text{S.S. of calender roll} \times \text{dia. of feed roll}}{\text{S.S. of feed roll} \times \text{dia. of calender roll}}$$

$$\text{S.S. of roll} = \text{rpm.} \times \text{circumference}$$

$$\text{draft} = \frac{\text{product of all driver-gear teeth} \times \text{dia. of calender roll}}{\text{product of all driven-gear teeth} \times \text{dia. of feed roll}}$$

$$\frac{\text{rpm. calender roll}}{\text{rpm. beater}} = \frac{\text{dia. feed pulley} \times \text{driver gears}}{\text{dia. clutch pulley} \times \text{driven gears}}$$

$$\text{rpm. calender roll} = \frac{\text{dia. feed pulley} \times \text{driver gears} \times \text{rpm. beater}}{\text{dia. clutch pulley} \times \text{driven gears}}$$

$$\frac{\text{S.S. of calender roll}}{\text{cir. of calender roll}} = \frac{\text{dia. feed pulley} \times \text{driver gears} \times \text{rpm. beater}}{\text{dia. clutch pulley} \times \text{driven gears}}$$

$$\underset{\text{(or inches of lap per min.)}}{\text{S.S. of calender roll}} = \frac{\text{dia. feed pulley} \times \text{driver gears} \times \text{rpm. beater} \times \text{cir. calender roll}}{\text{dia. clutch pulley} \times \text{driven gears}}$$

$$\text{inches of lap in 8 hrs. (100\%)} = \text{S.S. of calender roll} \times (8 \times 60)$$

$$\text{yds. of lap in 8 hrs.} = \frac{\text{S.S. calender roll} \times 480}{36}$$

$$\text{lbs. of lap in 8 hrs.} = \frac{\text{oz. lap} \times \text{yds. of lap in 8 hrs.}}{16}$$

$$\text{production constant} = \frac{\text{production}}{\text{oz. lap} \times \text{dia. feed pulley} \times \text{rpm. beater}}$$

$$\text{production} = \text{constant} \times \text{oz. lap} \times \text{dia. feed pulley} \times \text{rpm. beater}$$

$$\text{dia. feed pulley} = \frac{\text{production}}{\text{constant} \times \text{oz. lap} \times \text{rpm. beater}}$$

Finisher

$$\text{draft} = \frac{\text{driver gears} \times \text{dia. front calender roll} \times \text{dia. driver cone}}{\text{driven gears} \times \text{dia. feed roll} \times \text{dia. driven cone}}$$

$$\frac{\text{driven draft gear}}{\text{driver draft (cone) gear}} = \frac{\text{driven gears} \times \text{dia. calender roll} \times \text{dia. driver cone}}{\text{driver gears} \times \text{draft} \times \text{dia. feed roll} \times \text{dia. driven cone}}$$

$$\text{draft} = \text{draft constant} \times \frac{\text{driven draft gear}}{\text{driver draft gear}}$$

To calculate a change of draft:

$$\frac{\text{driver draft gear needed}}{\text{driven draft gear needed}} = \frac{\text{present driver}}{\text{present driven}} \times \frac{\text{present draft}}{\text{needed draft}}$$

$$\frac{\text{driver draft gear needed}}{\text{driven draft gear needed}} = \frac{\text{present driver}}{\text{present driven}} \times \frac{\text{present oz. lap delivered}}{\text{needed oz. lap}}$$

$$\frac{\text{driver draft gear}}{\text{driven draft gear}} = \frac{\text{draft constant} \times \text{oz. lap delivered}}{\text{doublings} \times \text{oz. lap fed}}$$

$$\text{beats per inch} = \frac{\text{blades in beater} \times \text{rpm. beater}}{3.1416 \times \text{dia. feed roll} \times \text{rpm. feed roll}}$$

$$\text{feed-pulley dia. needed} = \frac{\text{present beats per in.} \times \text{dia. present feed pulley}}{\text{needed beats per in.}}$$

$$\text{rpm. of beater} = \frac{3.1416 \times \text{dia. feed roll} \times \text{rpm. feed roll} \times \text{beats per in.}}{\text{blades in beater}}$$

CARDS

Draft

$$\text{draft} = \frac{\text{product of driver gears} \times \text{dia. coiler calender roll}}{\text{product of driven gears} \times \text{dia. lap roll}}$$

$$\text{draft constant} = \text{draft} \times \text{draft change gear}$$
$$\text{draft change gear} = \text{draft constant} \div \text{draft}$$
$$\text{draft} = \text{draft constant} \div \text{draft change gear}$$

To calculate a change of draft:

If the same oz. lap is to be used:

$$\text{draft gear needed} = \frac{\text{present draft gear} \times \text{present draft}}{\text{needed draft}}$$

$$\text{draft gear needed} = \frac{\text{present draft gear} \times \text{gr. sliver needed}}{\text{present gr. sliver}}$$

If the oz. lap is to be changed:

$$\text{draft gear} = \frac{\text{draft constant} \times \text{gr. sliver}}{437.5 \times \text{oz. lap}}$$

$$\text{draft gear needed} = \frac{\text{present draft gear} \times \text{present oz. lap} \times \text{gr. sliver needed}}{\text{oz. lap to be used} \times \text{present gr. sliver}}$$

Production

$$\text{rpm. doffer} = \frac{\text{driver gears} \times \text{dia. driver cylinder pulley} \times \text{dia. small lickerin pulley} \times \text{rpm. cylinder}}{\text{driven gears} \times \text{dia. lickerin drive pulley} \times \text{dia. doffer production pulley}}$$

$$\underset{\text{(doffer change gear)}}{\text{production gear needed}} = \frac{\text{present gear} \times \text{present gr. sliver} \times \text{production needed}}{\text{gr. sliver needed} \times \text{present production}}$$

$$\text{production constant} = \frac{\text{production}}{\text{gr. sliver} \times \text{rpm. doffer}}$$

$$\text{production} = \text{production constant} \times \text{gr. sliver} \times \text{rpm. doffer}$$

DRAWING FRAME

Draft

$$\text{draft} = \text{draft constant} \div \text{draft gear}$$

To calculate a change of draft:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present draft}}{\text{needed draft}}$$

If gr. sliver fed and gr. sliver delivered are both changed:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present gr. sliver fed} \times \text{gr. sliver to be delivered}}{\text{present gr. sliver delivered} \times \text{gr. sliver to be fed}}$$

If gr. sliver fed remains the same and gr. sliver delivered is changed:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{gr. sliver to be delivered}}{\text{present gr. sliver delivered}}$$

If gr. sliver fed is changed and gr. sliver delivered remains the same:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present sliver fed}}{\text{gr. sliver to be fed}}$$

Production

$$\text{production constant} = \frac{\text{production}}{\text{gr. sliver delivered} \times \text{rpm. front roll}}$$

$$\text{production} = \text{production constant} \times \text{gr. sliver} \times \text{rpm. front roll}$$

$$\text{production in 8 hrs.} = \frac{480 \times \text{rpm. front roll} \times \text{cir. front roll} \times \text{gr. sliver} \times \text{deliveries}}{36 \times 7{,}000}$$

ROVING FRAME

Draft

Slubber

$$\text{draft} = \frac{12 \times \text{gr. sliver fed} \times \text{hank roving delivered}}{100}$$

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present draft}}{\text{draft needed}}$$

If gr. sliver and hank roving are changed:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present HR} \times \text{present gr. sliver}}{\text{HR needed} \times \text{gr. sliver needed}}$$

If gr. sliver remains the same but hank roving is changed:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present HR}}{\text{HR needed}}$$

If gr. sliver is changed but hank roving remains the same:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present gr. sliver}}{\text{gr. sliver needed}}$$

Twist

tpi. = rpm. of flyer ÷ (rpm. front roll × cir. front roll)
twist constant = twist gear × tpi.
twist gear = twist constant ÷ tpi.
tpi. = twist constant ÷ twist gear

To change tpi.:

$$\text{twist gear needed} = \frac{\text{present gear} \times \text{present tpi.}}{\text{tpi. needed}}$$

If hank roving is changed:

$$\text{twist gear needed} = \frac{\text{present gear} \times \sqrt{\text{present HR}}}{\sqrt{\text{HR needed}}}$$

Lay

lay constant = lays per inch × lay gear
lay gear = lay constant ÷ lays per inch

If lays per inch are to be changed:

$$\text{lay gear needed} = \frac{\text{present gear} \times \text{present lays per inch}}{\text{lays per inch needed}}$$

If hank roving is to be changed but the twist multiplier remains the same:

$$\text{lay gear needed} = \frac{\text{present gear} \times \sqrt{\text{present HR}}}{\sqrt{\text{HR needed}}}$$

Tension

$$\text{tension gear needed} = \frac{\text{present gear} \times \sqrt{\text{present HR}}}{\sqrt{\text{HR needed}}}$$

Running time

(minutes bobbin in creel will last)
minutes = inches of roving on bobbin ÷ surface speed of back roll

Production

$$\text{minutes per doff} = \frac{3 \times 105 \times \text{HR} \times \text{oz. on full bobbin}}{0.5236 \times \text{rpm. front roll} \times \text{dia. front roll}}$$

$$\text{doffs in 8 hrs.} = \frac{480}{\text{mins. per doff} + \text{mins. for doffing}}$$

lbs. in 8 hrs. = doffs in 8 hrs. × lbs. per doff

ROVING AND YARN NUMBER

1 lb. = 7,000 grains
1 skein or lea = 120 yds.
1 hank = 840 yds.
yarn number (or hank roving) = hanks in 1 lb.
yarn number (or HR) = 1 ÷ weight (in lbs.) of 1 hank
pounds in 1 hank = 1 ÷ yarn number (or HR)
yarn number (or HR) = hanks ÷ weight (in lbs.)
pounds = hanks ÷ yarn number (or HR)
yarn number (or HR) = 8.33 ÷ wt. (in grs.) of 1 yd.

$$\text{yarn number (or HR)} = \frac{8.33 \times \text{yds.}}{\text{wt. (in grs.)}}$$

$$\text{wt. (in grs.)} = \frac{8.33 \times \text{yds.}}{\text{yarn number (or HR)}}$$

$$\text{yds.} = \frac{3 \times \text{wt. (in grs.)} \times \text{yarn number (or HR)}}{25}$$

Roving or yarn on bobbins, spool, or beam

$$\text{yarn number (or HR)} = \frac{\text{ends} \times \text{yds. in each end}}{840 \times \text{wt. (in lbs.)}}$$

$$\text{yds. in each end} = \frac{840 \times \text{wt. (in lbs.)} \times \text{yarn number (or HR)}}{\text{ends}}$$

$$\text{wt. of yarn on beam, etc.} = \frac{\text{ends} \times \text{yds. in each end}}{840 \times \text{yarn number (or HR)}}$$

$$\text{ends on beam} = \frac{840 \times \text{wt. (in lbs.) of yarn on beam} \times \text{yarn number}}{\text{yds. in each end}}$$

SPINNING FRAME

Spindle speed

Band drive

$$\frac{\text{rpm. of spindle whorl}}{\text{rpm. of cylinder}} = \frac{\text{dia. of cylinder} + 1/8 \text{ in.}}{\text{dia. of whorl} + 3/16 \text{ in.}}$$

Tape drive

$$\frac{\text{rpm. of spindle whorl}}{\text{rpm. of cylinder}} = \frac{\text{dia. of cylinder} + 1/16 \text{ in.}}{\text{dia. of whorl} + 1/16 \text{ in.}}$$

Twist

$$\text{tpi.} = \frac{\text{rpm. of spindle}}{\text{surface speed of front roll}}$$

$$\text{rpm. front roll} = \frac{\text{S.S. front roll}}{\text{cir. front roll}}$$

$$\text{tpi.} = \frac{\text{driven gears} \times (\text{rpm. whorl} \div \text{rpm. cylinder})}{\text{driver gears} \times \text{cir. front roll}}$$

$$\text{twist gear} = \frac{\text{driven gears} \times (\text{rpm. whorl} \div \text{rpm. cylinder})}{\text{driver gears} \times \text{tpi.} \times \text{cir. front roll}}$$

twist constant = tpi. × twist gear
twist gear = twist constant ÷ tpi.
tpi. = twist constant ÷ twist gear

$$\text{twist gear} = \frac{\text{twist constant}}{\text{twist multiplier} \times \sqrt{\text{yarn number}}}$$

To calculate twist changes:

$$\text{twist gear needed} = \frac{\text{present tpi.} \times \text{present twist gear}}{\text{tpi. needed}}$$

$$\text{twist gear needed} = \frac{\sqrt{\text{present yarn number}} \times \text{present twist gear}}{\sqrt{\text{yarn number needed}}}$$

Draft

$$\text{draft} = \frac{\text{driver roll gears} \times \text{dia. front roll}}{\text{driven roll gears} \times \text{dia. back roll}}$$

$$\text{draft gear} = \frac{\text{driver roll gears} \times \text{dia. front roll}}{\text{driven gear on front roll} \times \text{draft} \times \text{dia. back roll}}$$

draft constant = draft gear × draft
draft gear = draft constant ÷ draft
draft = draft constant ÷ draft gear

$$\text{actual draft} = \frac{\text{yarn number} \times \text{doublings}}{\text{HR fed}}$$

To calculate draft changes:

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present draft}}{\text{needed draft}}$$

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present yarn number} \times \text{HR to be used}}{\text{yarn number needed} \times \text{present HR}}$$

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{present yarn number}}{\text{yarn number needed}}$$

$$\text{draft gear needed} = \frac{\text{present gear} \times \text{wt. of 120 yds. of yarn to be spun}}{\text{wt. of 120 yds. of present yarn}}$$

Lay

$$\text{lay gear needed} = \frac{\text{present gear} \times \sqrt{\text{present yarn number}}}{\sqrt{\text{yarn number needed}}}$$

Production

$$\text{hanks of yarn per spindle in 8 hrs.} = \frac{8 \times 60 \times 3.1416 \times \text{dia. front roll} \times \text{rpm. front roll}}{36 \times 840}$$

LOOM

Pick gear

ppm. = ppi. × surface speed of take-up roll
S.S. take-up roll = rpm. × cir.
ppm. = ppi. × rpm. take-up roll × cir. take-up roll

If the loom has a pick-pawl take-up (pick gear is a driven gear):

$$\text{ppi.} = \frac{\text{driven gears in pick-gear chain}}{\text{driver gears} \times (\text{cir. take-up roll} - 2\tfrac{1}{2}\% \text{ cir take-up roll})}$$

$$\text{pick gear} = \frac{\text{driver gears in pick-gear chain} \times \text{ppi.} \times 0.975 \text{ cir. take-up roll}}{\text{driven gears (except pick gear)}}$$

pick constant = pick gear ÷ ppi.
pick gear = pick constant × ppi.

If the loom has a double-worm take-up (pick gear is a driver gear):

production = pick gear × ppi.
pick gear = pick constant ÷ ppi.

$$\text{pick gear needed} = \frac{\text{present gear} \times \text{ppi. needed}}{\text{present ppi.}}$$

Holding Back The Sea

Textile products are playing an increasingly important role in a 25-year project to give the Dutch people an additional 500,000 acres of land now on the bottom of the ocean.

Nylon is being used in various forms to replace older methods of protecting Holland's famous dikes from the scouring action of ocean currents. The same man-made fiber is being used in other ways to speed completion of a dike reinforcement program begun in 1953 and scheduled for completion in 1978.

The whole operation is being pushed ahead of schedule however, by the use of nylon sheeting to protect the sea bed of dikes from being washed away by swift movement of ocean waters. The nylon used to protect the dike beds is formed into units 50 feet by 250 feet, sewed to form a series of tubes which are filled with a mixture of sand and water. The number of tubes, which act as anchors, is determined by the force of the current at any given area in which the sheeting is used.

The nylon sheeting, called "sunk sheets", is replacing normally used fascine (bundles of wood sticks) and stone mattresses. The textile product is considerably less expensive than the older method and can be laid faster, through the use of special equipment which unfolds the "sunk sheets" in a predetermined pattern and stretches them into place at the base of the dikes.

In addition to the "sunk sheets", several other applications have been found for nylon in the dike reinforcement project.

One is as a lining to protect the sloping side of a dike, dam or mound from the scouring action of rapidly moving water. For years such protection has been provided by stone and concrete, applied on a clay base which closed in the sand beneath it.

Another development involves strips of nylon which are cemented into the edges of tiles. The extensions of the strips are spread on the sloping sides of dikes, allowing water to be drained but holding the sand in place. This new technique eliminates the need for an expensive layer of clay which has been applied to the sand base of dikes.

Other uses for nylon fabric in the dike project include:

— Stretching waterproofed, bitumen-coated nylon sheets on the bottom of dikes to prevent dike leakage and the loss of water in canals.

— Constructing dams and breakwaters with 2200-pound capacity sand-filled bags of rip-stop nylon which can be used again after a dike has been completed and the protecting dams and breakwaters removed.

— Utilizing smaller, 88-pound-capacity nylon sand bags for closing breaks and other openings in dikes and dams. These smaller bags can be stored in areas of potential danger, and are both moistureproof and rotproof.

— Strengthening wooden paling poles with nylon fabric to prevent erosion of canal banks. This is still in the testing stage, but the new method already appears to be more suitable than the use of synthetic foil which has low strength.

John G. Snip of the Department of Waterways in The Netherlands has said that the use of man-made fibers in the dike reinforcement project may lead to better and cheaper construction methods than has ever been possible with more conventional construction techniques. The project has already demonstrated that modern textiles can be successfully adapted to almost any need—including holding back the sea.

In the first nine months of 1962, the countries which exported more than 323 million square yards of cotton textile products to the United States markets bought less than 6 million yards from American mills. This is a strong contributing factor in the outflow of gold from the United States.

SEARCH and RESEARCH

New business opportunities and improved profitability, twin goals of alert management, are being realized through work in the laboratory as more and more textile producers place strong emphàsis on research and development programs.

In the constant battle to remain competitive in the face of never-ending technological break-throughs, the role of the scientist is increasing rapidly in the textile industry.

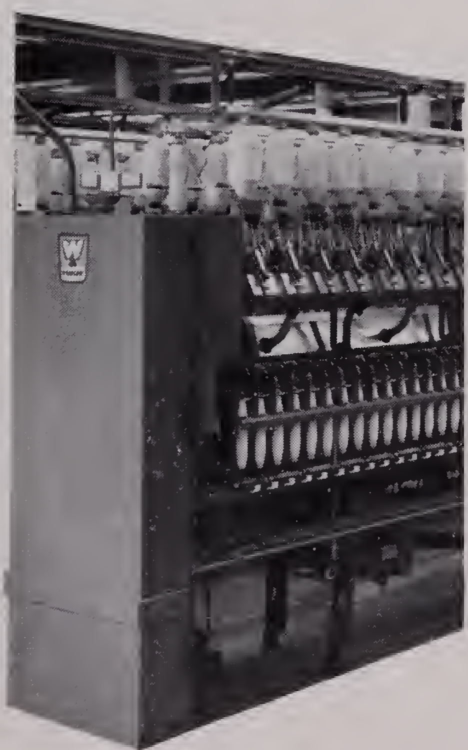
Textile scientists and technicians are constantly searching for new uses for current products and, at the same time, are seeking ways to improve manufacturing processes in the effort to turn out better products at lower costs.

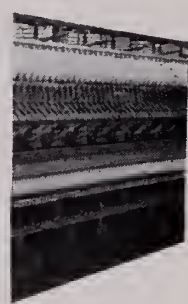
Coupled with these efforts is the search for completely new products and methods to produce those new products economically. Changes within the textile industry during the past few years have been described as astounding. Products on the market today were but a gleam in some scientist's eye only a short 20 years ago.

As management has learned that research expenditures have a direct bearing on increased income, accelerated research efforts in the industry are inevitable. As these efforts bear fruit, they will bring about changes in products and manufacturing processes that today would seem incredible.

SHELTERS

Shelters made of a translucent nylon-vinyl fabric have saved the U. S. Corps of Engineers both time and money in constructing 11 circuit breakers at the Bonneville Dam in Oregon. The shelters protected the circuit breakers, located on the roof of the power house, from inclement weather, and, also, prevented moisture from collecting and being absorbed by sensitive parts. The company which produced the shelters said winds up to 87 miles-per-hour had almost no effect and work moved ahead regardless of weather conditions.





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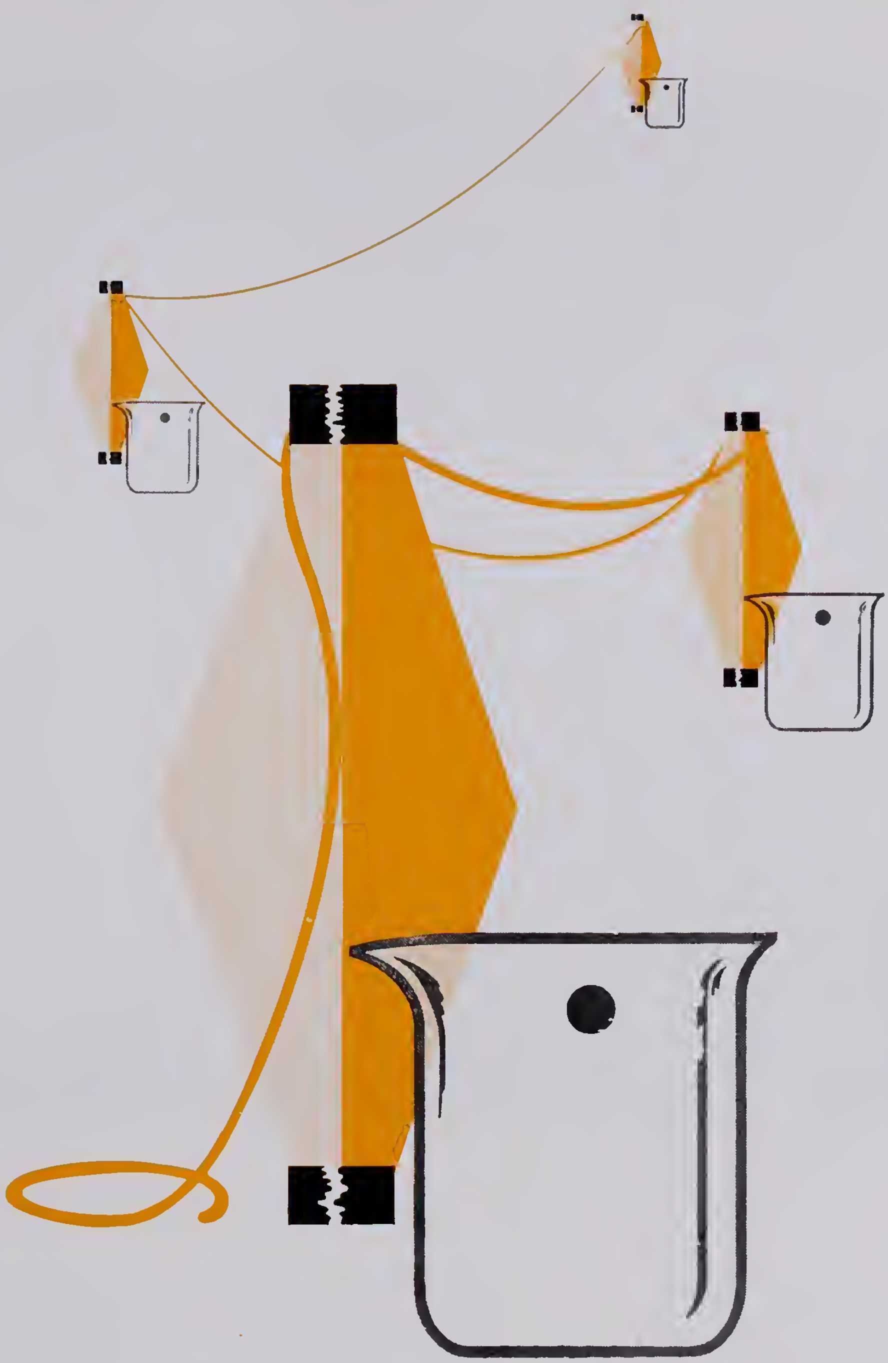

bobbin and beaker

CLEMSON COLLEGE

THE

Bobbin & Beaker

Official Student Publication
Clemson School of Industrial Management and Textile Science

VOL. 20 SUMMER ISSUE — 1963 NO. 4

The Staff

In This Issue

The BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Industrial Management and Textile Science.

Address: The Bobbin and Beaker, School of Industrial Management and Textile Science, Clemson College, Clemson, South Carolina.

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

From the Editor

Once again a new Bobbin and Beaker staff has the task of strengthening the link between the textile industry and the college student. At this time the staff wishes to extend to each and every reader an invitation to submit suggestions on any particular phase of our publication. We are, at all times, open for suggestions concerning the type of material you want to read. This is your magazine, and the staff wants to make it as enjoyable and educational as possible. Let us know what you like!

The new staff is headed by Jerry W. Blackwood, a textile management major, from Gaffney, South Carolina, as Editor. Gary A. Hall, a textile science major, from Greenwood, South Carolina, will serve as Business Manager. The new Circulation Manager will be Douglas V. Rippy, a textile management major from Clinton, South Carolina. Steven D. Tucker, a textile management major, from Spartanburg, South Carolina, has the position of Advertising Manager. The Managing Editor will be Henry M. Poston, a textile management major, from Johnsonville, South Carolina.

We take pride in dedicating this issue of the Bobbin and Beaker to Dean Gaston Gage. Our congratulations and heartfelt thanks are extended to Dean Gage.

—Jerry W. Blackwood, Editor

Left to right: Henry Poston, Managing Editor; Steve Tucker, Advertising Manager; Doug Rippy, Circulation Manager; Jerry Blackwood, Editor. Absent, Gary Hall, Business Manager.

DEAN GAGE RETIRES

By Henry M. Poston, TM '65

At the close of this academic year, Clemson College will lose the services of an esteemed man who has dedicated much of his life preparing young men to enter the textile industry. Dean Gaston Gage has announced his plans for retirement after an outstanding service record of thirty-one years to our school.

Gaston Gage was born in 1898 at Chester, South Carolina, attended Chester's graded schools and graduated from Chester High School. He attended the University of South Carolina, served briefly in World War I, and entered Clemson College in January, 1919, after being discharged from the Army. He received his B.S. degree in Textile Engineering from Clemson College in 1921.

After leaving Clemson, he went to work for Baldwin Mills at Chester, which later became one of the Aragon-Baldwin groups of J. P. Stevens and Co., Inc. Mr. Gage worked here until the summer of 1932, serving as paymaster, second-hand of the weave room, and overseer at various times of the card room, spinning room, and cloth room. He returned once more to Clemson in September 1932, as an instructor in the Yarn Manufacturing Department of the Textile School. He furthered his education at the University of North Carolina in 1935 and 1936 and earned his M.Ed. at Penn State in 1941. He was promoted to Associate Professor in 1943, a full professor in 1946, appointed head of the Yarn Manufacturing Department in January, 1949, appointed Acting Dean of the School of Textiles on July 1, 1957, Dean of the School of Textiles in October 1958 and continued in this capacity when the School of Textiles was combined with the Industrial Management Department to form the School of Industrial Management and Textile Science on July 1, 1962.

Dean Gage has served on the Faculty Athletic Committee and on the class schedule committee for over twenty years. He is also proud of the fact that he was at the organizational meeting of IPTAY, was a Charter Member, and has been a continuous member ever since. He is active in many civic and religious organizations and has served as chairman of the Board of Stewards, and superintendent of Sunday School of the Clemson Methodist Church. He has also served as chairman of the Board of Trustees for the local school system.

Mr. Gage was married to Ruth Vardell on April 9, 1927. They have two sons, both of whom graduated from Clemson in Textile Engineering, one in 1951, the other in 1955.

Dean Gage is a member of the Kappa Alpha Order, Phi Psi Fraternity, the American Society for Testing Materials, the International Organization for Standardization Technical Committee on Textiles, the American Society of Quality Control, National Council for Textile Education, the Textile Institute, and the Southern Textile Association.

It would take many more pages to list all the acchievements of this outstanding man. We have merely attempted to summarize and give you a brief view of a life of dedication, loyalty and service. The Bobbin and Beaker Staff joins the faculty and students of the School of Industrial Management and Textile Science in extending a salute and wishing the best luck to you, Gaston Gage.

Left to right: Nixon Dobey, treasurer; Wes Connelly, secretary; Steve Tucker, president; Henry Poston, vice-president.

A. A. T. T. Progresses During Second Year

By Wesley Connelly, T.M. '65

The Clemson student chapter of AATT has, been increasingly active as it has progressed in its second year at the college.

The members have participated in two field trips. First semester they toured Deering-Milliken Research Corporation in Spartanburg where they also had lunch. On the same trip the group was shown through Saco-Lowell Shops in Easley, S. C. Of special interest was a prototype set-up of the continuous automated spinning system.

During the second semester the AATT sponsored a trip to Wunda Weave Carpet Mill of Greenville.

As a special project the AATT sold Christmas cards to raise funds. In April the club held their annual banquet at Dan's Dining Room. Special guests were Dean Gaston Gage and Mr. Robert A. Hudson, chief engineer of Saco-Lowell Shops in Easley. Mr. Hudson, speaker for the evening, talked on the history and development of Saco-Lowell since its beginning in 1813. The Club presented Gaston Gage, Dean of the School of Industrial Management and Textile Science, with a silver cup in honor of his service to the school for the past thirty-one years.

The new officers for the 1963-64 school term were recently elected. Doug Tucker is AATT's new president. He is a rising Senior from Spartanburg and is majoring in T.M. The newly-elected vice-president is Henry Poston from Johnsonville, S. C. He is a T.M. major. Secretary for next year is Wesley Connelly of Spartanburg. He is a rising Junior and majors in Textile Management. Nixon Dobey, also of Spartanburg, is the new treasurer. Nixon is a T.M. major and is a rising Senior.

The Dean Says...

I came to Clemson to teach in September 1932. I had graduated in 1921 and had worked at the old Baldwin Mill at Chester since. I came to Clemson to fill in for one year while "Snake" Lee was away doing graduate work. At the end of the year he asked leave for another year and I was asked to stay. By the end of this second year the enrollment had increased to the point where another teacher was needed and I was asked to stay on. I have been here since—thirty-one years.

Since joining the faculty I have had two sons and four nephews to graduate. I now have a grand-nephew in school. Three of my nieces married Clemson men.

I have been on the Athletic Council for twenty-seven years. I saw football come from the place where a tie with P. C. was a moral victory to a win in the Orange Bowl, from a sell out crowd of 11,000 against Wake Forest on Old Riggs Field to 46,000 against the University of South Carolina. I sat in a meeting in Mr. Jake Woodward's office with Rube Fike and six others at the birth of IPTAY. The ten dollars I took out of my billfold that night dealt it a severe blow. I view with pride the accomplishments of this child. I know a number of holders of good jobs in the textile industry who were educated at Clemson by IPTAY.

I retire from this job on September 1, 1963. I have had a wonderful time at Clemson. I value highly the friendships I have been able to make. Some of my staff members think I know everybody in the textile industry. That is an exaggeration, but I do know many people.

Wallace Trevillian will succeed me as Dean on September 1. He has been at Clemson sixteen years. He organized and built the Industrial Management Department. May I commend to you the organization I leave behind.

—Gaston Gage

Outstanding Seniors . . .

By
Marshall White, T.C. '65

LEWIS M. (Mickey) CLYBURN

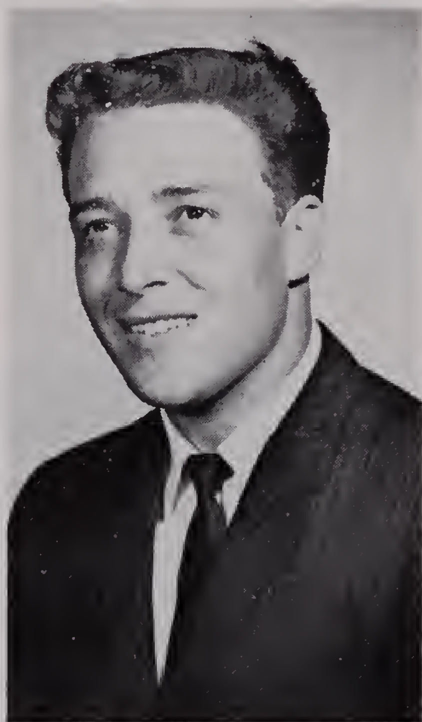
Mickey Clyburn is a twenty-one year old Textile Management major from Kershaw, South Carolina. He has had experience working during the summers for Leroy Springs and Company in Kershaw.

Mickey was in the Pershing Rifles and he is now enrolled in Air Force ROTC. After graduation he is going into the Air Force.

While at Clemson, Mickey has been active in the Hall Supervisor's Association, Phi Psi, and Delta Phi Kappa. He is presently editor of the Phi Psi Fraternity.

Mickey is the hall supervisor for D-5. He has received a Chemstrand Scholarship to help finance his education.

Ben Smith, a twenty-one year old Textile Management major, commutes from Fountain Inn, South Carolina. Ben is married and has a little girl, Deborah Denise, who is thirteen months old.



BEN M. SMITH

To help finance his education, Ben has received a Chemstrand Scholarship. He has gained experience by working for Southern Bleachery and Print Works in Taylors, South Carolina.

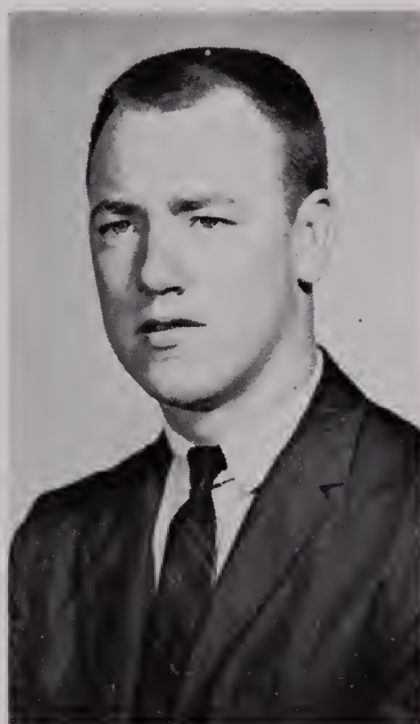
Ben is a member of Phi Psi Fraternity and has also participated in the Glee Club.

Ray Sherbert is a Textile Chemistry major from Woodruff, South Carolina; he is twenty-one years old and is married. Ray has a son, Thurman Ray, Jr., who is one year old.

Ray is a member of Phi Psi Fraternity and Treasurer of the AATCC. He received the AATCC Award for 1963.

After his graduation, Ray plans to attend graduate school at Clemson.

Ray has received an Inman-Riverdale Scholarship for four years and a Carolina Yarn Association Scholarship for one year.



THURMAN R. SHERBERT

A. A. T. C. C. Hi-Lights

By Charles Funderburke, TC '65

The AATCC Student Club meets every second and fourth Tuesday of each month in the Phi Psi Lounge to discuss plans in which the club wishes to participate throughout the year.

This year the club visited four plants which included Riegel Textile Corporation plant at Ware Shoals, Chemstrand Corporation plant at Greenwood, Deering Milliken Research Center at Spartanburg, and Lyman Printing and Finishing Company at Lyman.

We observed the printing and finishing operation at Riegel and ended the guided tour with an informal discussion with Mr. Cecil Thompson, General Superintendent.

At Chemstrand we received an explanation of the Nylon process in the plant conference room before observing the various processes used by Chemstrand to produce the Nylon fiber.

We toured the various laboratories at the Deering Milliken Research center which concluded with a brief explanation of the laboratory operation by the specialist of rayon, cotton and chemicals.

A tour through Lyman Printing and Finishing Company gave us a brief glance at their printing, dyeing and finishing operation. We also toured the engraving operation where we observed the photo-engraving procedure and the pantagraph procedure of manufacturing print rollers of various patterns for printing.

The club elected the officers for next year at their meeting held on April 9, 1963. President for the coming year is Randy Prater, TC major from Seneca, S. C.; Vice President is Bill Hawfield, TC major from Lancaster, S. C.; Secretary is Charles Funderburke, TC major from Rock Hill, S. C. and Treasurer Robert Fulmer, TC major from Leesville, S. C.

Two suppers were planned for this year. The first was held on December 11, 1963, with guest speaker Mr. Lawrence Kogen, Chemist of Standard Brands, Inc., who spoke on Bacterial Alpha Amylose.

The second supper is scheduled before the end of the semester.

Left to right: Bill Hawfield, vice-president; Robt. Fulmer, treasurer; Michael Prater, president; Chas. Funderburke, Secretary.

BOOK REVIEW

One of the most recent additions to Sirrine Library is "Industrial Engineering Manual for the Textile Industry" by Norbert Lloyd Enrick. We consider this book a must for every college graduate directly or indirectly connected with the textile industry.

Professor Enrick divides his book into three main parts:

Part I, Work measurement; Part II, Systems, Procedures, and Controls; and Part III, Operations Research Techniques.

For more information contact Professor Enrick, University of Virginia Graduate School of Business Administration, Charlottesville, Virginia.

Left to right: Doug Rippy, president; Jerry Blackwood, vice-president; Steve Tucker, secretary; Michael Prater, treasurer.

Phi Psi News Notes

By
Robert R. Sarratt, Secretary

Since the fall issue of the "Bobbin and Beaker," Iota Chapter of Phi Psi has initiated five new members. These new members were treated to a steak supper at Dan's on March 18, together with the rest of the Iota Chapter.

The new members are Sonny White, a Textile Chemistry sophomore from Rock Hill; Hank Baumann, a Textile Management sophomore from Greenville; Bill Davidson, a Textile Management junior from Avondale, N. C.; Spencer Bates, a Textile Chemistry junior from Swannanoa, N. C.; and Barry Barrineau, a Textile Management senior from Lake City. All five of these new brothers have done outstanding work here at Clemson and we are glad to have them as members of Phi Psi.

At the meeting on April 1, the officers for next year were elected. They are: Doug Rippy—President, Jerry Blackwood—Vice-President, Michael R. Prater — Treasurer, Steven D. Tucker — Secretary, Sonny White—Corresponding Secretary, Don Shirley —Senior Warden, and Gary Hall—Junior Warden. All of the new officers are juniors except Don, a senior, and Sonny, a sophomore.

Doug is majoring in Textile Management and hails from Clinton. He is the new Circulation Manager for the "Bobbin and Beaker" and is also on the "TAPS" staff and in A.A.T.T. Jerry, the new Editor for the "Bobbin and Beaker", is from Gaffney and is majoring in Textile Management. Michael Prater, a Textile Chemistry major, is from Seneca. Don is from Cateechee and Steve is from Spartanburg, and they both major in Textile Management. Gary Hall, a C.D.A. junior staffer from Greenwood, is majoring in Textile Science.

We, of Iota Chapter, would like to wish all the graduating seniors the best of luck in their jobs or in the service because we feel they are "the best." They are "Clemson Men."

Remember . . .

For the sixth summer the School of Industrial Management and Textile Science is offering a short course program for those in the Textile industry and related fields.

The first two courses, Yarn Manufacturing and Fabric Development, are especially recommended for the college graduates, other than textile school graduates, who will enter industry this June. This program will serve them well, regardless of what phase of the industry they enter. It will be ideal for those entering a training program or for those going into the various staff fields. High school graduates will benefit.

YARN MANUFACTURING — Theory and Laboratory—Date Offered—June 10 or July 8, 1963 (3 weeks)

FABRIC DEVELOPMENT—Theory and Laboratory —Date Offered—July 8, 1963 (3 weeks)

SUPERVISOR DEVELOPMENT—Theory—Date Offered June 10 or July 8, 1963 (3 weeks)

METHODS ANALYSIS & TIME STUDY—Theory and Laboratory—Date Offered—June 17 or July 15, 1963 (2 weeks)

BASIC TEXTILE CHEMISTRY—Theory and Laboratory—Date Offered—July 15, 1963 (2 weeks)

ADVANCED TEXTILE CHEMISTRY—Theory and Laboratory—Date Offered—July 29, 1963 (2 weeks)

Cost. For each course the cost will be:

	2 Week Course	3 Week Course
Class fee	$60.00	$90.00
Supplies	10.00	--
Board	20.00	30.00
Room	10.00	15.00
Medical Fee	1.50	2.25
	$101.50	$137.25

For additional Information Write:

Gaston Gage, Dean
School of Industrial Management
and Textile Science
Clemson College
Clemson, S. C.

Left to right: Nathan Derrick, historian; Henry Milam, vice-president; Bill Clement, treasurer; Jack Fallaw, president.

I. M. S. ENJOYS SUCCESSFUL YEAR

The Industrial Management Society has had another successful year with a full calendar of field trips, lectures, and banquets.

Last semester I.M.S. again had the opportunity of visiting Carling's Brewery in Atlanta. The Ford Motor Assembly Plant and the Winn Dixie plant in Greenville were also visited.

We were very fortunate in having three outstanding speakers to address us this year. These included: Dr. F. A. Burtner of the Sociology Department, Associate Professor L. M. Bauknight of the Agricultural Economics Department, and Mr. D. G. Hughes, the Placement Director here at Clemson.

Two banquets, one each semester, have highlighted our social activities for the year.

The newly elected officers for next year are: president, Jack Fallaw from Belvedere; vice-president, Henry Milam from Ninety Six; treasurer, Bill Clement from Spartanburg; historian, Nathan Derrick from Columbia.

THE SOCIETY FOR ADVANCEMENT OF MANAGEMENT MAKES SIGNIFICANT GROWTH

The Society for Advancement of Management is now completing the most successful year in its history at Clemson. During the 1961-62 school year, the Clemson Chapter of S.A.M. won national recognition for the tremendous membership growth which it enjoyed. Over eighty members were on the roll of the society during the first semester of the year now coming to a close. The officers, who have served S.A.M. so effectively during the second semester of this year, are: Bill Smith, president; Ronald Barrett, secretary; Terry McMichael, Treasurer.

Among the outstanding speakers, who have taken part in S.A.M. programs during the year have been Dr. Hugh Macaulay, Dean of the Graduate School at Clemson College, and Mr. R. A. (Tony) Pearson, a local resident, who does personnel work for the worsted and woolen divisions of Deering Milliken, Inc., and is a member of the Senior Chapter of the Society for Advancement of Management in Greenville, South Carolina. The President of the Senior Chapter, Kenneth J. Scarlett, a management consultant from Greenville, presented an excellent address on, "Future Advancements in Management", during the joint meeting of the student and senior chapters held early in March on the Clemson campus. In addition to the talk by Mr. Scarlett, the joint meeting included dinner and a visit to the planetarium in the new Physics Building.

One of the highlights of the entire year was the visit to Clemson made by Mr. and Mrs. Harold Fischer on March 29, 1963. Professor Fischer is President of the University Division of the Society for Advancement of Management. Representatives of the student chapter met with the Fischers both in Greenville and at Clemson. A dinner meeting, during which Mr. Fischer spoke to the student chapter members, was a feature of the program for the day, which, also, included visits to the Calhoun Mansion and the Hanover House.

Perhaps the most significant accomplishment, noted by Mr. Fischer during his visit, was the close cooperation between the Student Chapter of S.A.M. at Clemson and the Senior Chapter in Greenville. The best example of the relationship between the two groups was the conduct of the Career Day program at the college on March 26, 1963. At this time representatives of seventeen areas, within which Clemson graduates might find good opportunities to pursue their life's work, were on campus to talk with any student, who was particularly interested in their special field. Among the vocations represented were banking, insurance, accounting, sales, personnel, production control, operations research, and several types of engineering. Specific opportunities in the textile field and for military careers were presented for the consideration of those who were interested.

Another extremely important program sponsored by the Society for Advancement of Management, which seems to warrant repetition annually, was the forum on ethics in business, held for the first time on April 23, 1963. Other activities of the Society for Advancement of Management have included student discussion of topics of current interest, a demonstration by Southern Bell Telephone and Telegraph Co., representatives of the Telstar system of communication, and several interesting field trips. Among the plant visits, made by S.A.M. members during the year, were tours of the Jantzen facilities in Seneca, the Dunlop plant in Westminster, and the Buick, Oldsmobile, Pontiac Division of General Motors Corporation in Doraville, Georgia.

We all hope that those students who are interested in joining our group will contact us soon, take part in some of our functions, and become active members of S.A.M.

Special TEXTILE DICTIONARY *for BEST RESULTS in Textile Processing*

C

Corobex (Kôr ′a-bex)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors of bacterial origin.

Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

D

Discolite[2] (dĭs′kō·līte)

Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form.

A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

Dispersall (dĭs·pûr′sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing.

Used widely as a dispersing agent in dyeing synthetic fibers with disperse colors and for fast color salts and bases in Napthol dyeing and printing.

Effective in stripping to prevent redeposition of the color on stripped goods.

N

Neofinish (Ne/.O.Finish)

Non-Ionic softener dispersible in hot water, suitable for all textile fibres, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

Neowet (nē′ō·wĕt)

Complex Polyethelene Ether in the form of a pale yellow, slightly viscous liquid.

A non-ionic surface active wetting agent, effective at all temperatures. Completely compatible with enzymatic desizing agents and readily soluble in water. Contains 33⅓% active ingredients. Widely used in scouring all types of textile fabrics and for general wetting purposes.

Neowet X (nē′ō·wĕt)

Organic Ether Sulphonate in the form of a water white slightly viscous liquid.

An anionic surface active wetting agent, effective at all temperatures. Does not affect enzyme activity in desizing. Compatible with hydrogen peroxide and resin finishes. High detergent value. Contains 20% active ingredients.

Neozymes[1] (nē′ō·zīms)

Desizing agents made up of amylolytic, proteolytic and fat splitting enzymes available in the form of crystalline powder or liquid concentrate for high or low temperature requirements.

Neozymes quickly remove all trace of starch glue or gelatin sizing without danger of damage to even the most delicate fabrics. For best results, use with NEOWET to speed saturation.

P

Parolite[2] (păr′ō·līte)

Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics.

Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

V

Vatrolite[2] (văt′rō·līte)

Concentrated sodium hydrosulphite in the form of white crystalline powder. A powerful reducing agent for vat colors, ideal for dry feeding because of its free flowing, dustless character. Completely soluble in water.

Effective stripping agent for direct, sulphur and vat colors on cellulosic fabrics.

Quickly removes rust stains from cotton goods.

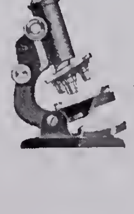
May be stored indefinitely.

Available with optical whites and in buffered formulas for high temperature use without excessive alkalinity.

Velvo Softener (vel′vō)

A highly sulphonated tallow in the form of a creamy white paste, easily dispersed in water. Used in general finishing of all types of textile fabrics. Will not "smoke off" or change color in high temperature operations such as calendering or drying. Has no effect on light fastness of colors.

Strategically placed warehouses plus company owned trucks add up to fast dependable delivery, every time.



Royce CHEMICAL COMPANY
EAST RUTHERFORD, NEW JERSEY

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FALL
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Bobbin & Beaker

THE

Bobbin & Beaker

Official Student Publication
Clemson School of Industrial Management and Textile Science

Vol. 21 FALL ISSUE No. 1

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The BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Industrial Management and Textile Science.

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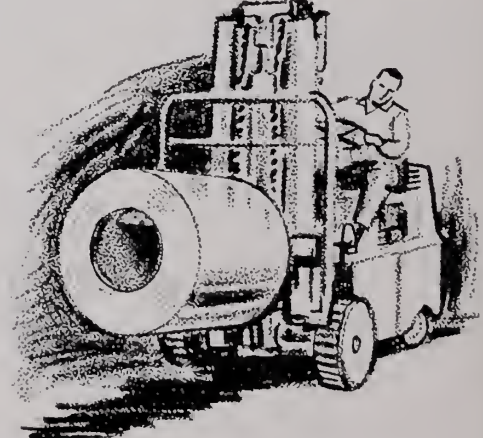

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from the Editor

With this issue we welcome Dean Wallace D. Trevillian as a new faculty advisor to our magazine. He, along with Professor D. P. Thomson, will assist the staff in producing quality reading material for all our readers.

Be sure to watch for Dean Trevillian's article, "Notes From The Dean," in each issue.

Our thanks go to Felix A. Buskey for his guest article, "Revolution in the Dyestuff Industry."

— Jerry W. Blackwood, Editor

SENIOR STAFF

Seated left to right:
Henry Poston,
Doug Tucker,
Jerry Blackwood.

Standing:
Gary Hall,
Doug Rippy.

Revolution In The Dyestuff Industry

By FELIX A. BUSKEY
President Althouse Chemical Company
Division of Crompton & Knowles Corp.
Reading, Pa.

BIOGRAPHIL NOTES

Mr. Buskey was appointed president of the Althouse Chemical Company in April of this year.

He was formerly executive vice president and general manager of the firm which manufactures quality dyestuff specialties for the textile trade at its Reading, Pa., plant.

Prior to joining Althouse, Mr. Buskey was president of Chem-Council Associates of Moorestown, N. J.. Previously, he had been senior vice president of the American Foam Rubber Corp., of Burlington, N. J.

A graduate of Northeastern University with a BS, he resides with his wife and two children at S. Tulpehocken Road, Reading, Pa.

Felix A. Buskey

A new technological surge is in the offing for the dyeing and finishing section of the textile manufacturing industry.

Textile dyestuff manufacturing in the sixties will be highlighted by the conversion of many-step processes into continuous single-step manufacturing processes to achieve greater production speeds.

Among the major advances in the offing are many processes which will revolutionize current thinking on some of the synthetic and older natural fibers.

Althouse Research has historically worked in the area of improving dyeing properties, increased wash fastness, and light fastness. Today Althouse continues its approach to the textile industry, plus an added effort toward reduction in costs, through cycle time and improved quality with reduced handling.

Althouse has a number of major contributions which it plans to introduce to the trade within the next two years. These contributions are the products of several years of research effort in both chemical and mechanical areas. Major breakthroughs are coming in some following areas:

1. Semi-continuous systems based on the use of new molecular concepts of the dyeing processes.
2. New continuous methods for steaming and increased penetration of dyestuffs at higher rates of speed.
3. Advances in padding techniques for piece dyeing of carpet.
4. New and faster dyestuffs and processes for pad dyeing cotton.
5. Increased use of instrumental color matching.

There is little doubt that the future trend of dyeing and finishing of textile will be following the direction of the past few years. This direction has meant an increase in the demand for faster dyes. The dyestuff industry with its extensive research program has sought to satisfy the demands for this increased fastness. Products of research have seen huge gains in the areas of reactive dyes for cellulosic fibers, neutral acid dyestuff for polyamides and polyamide wool blends, improved dispersed dyes for polyester for decreased sublimation and crocking, microdispersed for better handling in the dyehouse.

The new family of dyestuff arriving on the scene to dye polypropylene is based primarily on the chelating properties of the fiber itself. However, even as this is being written, new methods of modifying the polymers are appearing in the literature.

A whole new family of stretch fabrics based on Spandex, a generic name for the polyurethane fiber series, has changed the emphasis on dyeing in this area. The research on dyestuffs for this particular fiber will continue in the future as many of the dyes require considerable improvement and the lines of color need to be more comprehensive.

Continual rises in labor costs in the highly competitive textile market, together with increased effort to compete in international trade, are demanding not only faster dyes but better batch and continuous processing techniques. Many continuous dyeing procedures are being used at the present time, but they are still not enough of an improvement to offset increased costs.

It has become more apparent that the research programs of the dye manufacturers generate improved and faster dyeing procedures. These techniques are, in some cases, practically perfected, and we anticipate definite advances with this particular line of endeavor before the end of 1964.

Finishing can no longer be completely separated from the dyestuff field since the resulting fabric qualities are so definitely affected by the type and kind of finishing to which it is subjected. Reactive, permanent finishes that have excellent wash fastness properties with minimum effect on shade and light fastness are rapidly coming on the scene. There is little doubt that these finishes will gain momentum in the future and will be greatly improved.

Some one-step dyeing procedures have already been introduced. These however, are small beginnings since there are newer dyes and compounds required to bring this development into fruition. These new developments, reactive finishes and one-step dyeing and finishing procedures, will have to compete with our present-day best fastness and physical properties.

A whole new field—neither paper nor textile—is evolving from the non-woven area and is demanding newer types of processing and dyeing procedures. These techniques are gradually being perfected; however, it still remains to the future to innovate improved dyes and techniques.

The constant flow of new synthetic fibers demands continuous research programs for new dyes to color these fibers commensurate with fastness properties to make them usuable and salable since few fibers can exist in today's colorful world without suitable dyes for specific end uses.

For the dye manufacturer, the future holds many things—a great challenge in a constantly changing panorama of problems. Many new colors will be produced in the near future, together with speeded up techniques for applications as our answer to foreign competition which looms as a major factor in our consideration of the future.

New Dean Assumes Duties

By JULIAN H. BAUMANN
TM '65

Wallace D. Trevillian assumed the position of dean of the recently united School of Industrial Management and Textile Science on September 1, 1963. He succeeded Dean Gaston Gage, first dean of the new school. Dean Gage retired this year after thirty-one years of outstanding service to Clemson College.

Dean Trevillian was born in Charlottesville, Virginia, on May 1, 1918. He was educated in the public school system of Charlottesville. In 1940, he obtained a Bachelor of Science Degree in Commerce from the University of Virginia. By virtue of a Du Pont Fellowship, he received a Masters Degree in Economics from the University in 1947. While on leave from Clemson in 1950 he put in a year of graduate study in Economics from the University of California. Dean Trevillian received his Doctor of Philosophy Degree from the University of Virginia in 1954.

Dean Trevillian came to Clemson in 1947 as an instructor in Economics. He served as an assistant professor of Economics from 1948 to 1951. In 1951, he was promoted to the position of associate professor of Economics, and he served in this capacity until 1955. In 1955, when the Industrial Management curriculum was introduced into the School of Arts and Sciences, Dean Trevillian was appointed head of this new curriculum and promoted to professor of Economics. Under his able leadership, the Industrial Management curriculum has grown to attract the largest major course enrollment at Clemson.

In June, 1962, the Industrial Management Department was merged with the Clemson School of Textiles, to form the School of Industrial Management and Textile Science. Dean Gaston Gage, then dean of the Textile School, was appointed dean of the new school with Dr. Trevillian later assuming the position of Associate Dean. Upon Dean Gage's retirement in September, 1963, Dr. Trevillian assumed the position of Dean of The School of Industrial Management and Textile Science.

Since Dean Trevillian has assumed his new position, there have been several changes made in the school. All students in the school are required to wear coat and tie to all classes. This is a policy started by Dean Trevillian when he was head of the old

Industrial Management Department and which was undoubtedly influenced by the seven years he spent at the University of Virginia where coats and ties are mandatory for all campus activities. For an explanation of this policy Dean Trevillian has said "It has been scientifically proven that when people are dressed correctly and reflect good manners, they can think better and are more comfortable, regardless of the work they are doing."

Dean Trevillian has not put the classroom out of his busy schedule since assuming his new position. He still teaches two classes, an undergraduate course in Industrial Management and a graduate course in Managerial Policy. Dean Trevillian plans to continue in his capacity of "Teaching Dean" just as long as his other administrative duties allow. However, whether from classroom or from the office, the School of Industrial Management and Textile Science looks forward to Dean Trevillian's tenure of office with great expectation.

* * * * *

The "garment district" of New York City consumes a huge portion of the output of the American textile industry, and its annual dollar sales equal all the oil that comes from all the oil wells in Texas.

Outstanding Seniors . . .

Steven Douglas Tucker

Steven Douglas Tucker, a twenty-five year old Textile Management major, is a native of Spartanburg, S. C. He has completed his military obligation by serving 6 years in the Naval Reserve, two of which were active duty.

To aid with his college expenses, Doug received a Callaway Mills scholarship. He has received honors for three semesters while at Clemson. He is an active member of Phi Psi and Council of Club Presidents, Chairman of AATT, and is presently serving as Advertising Manager of Bobbin and Beaker.

Doug worked full time for the Deering Milliken Research Corporation in Spartanburg, S. C., for one and a half years before entering Clemson. He also worked the past two summers with the same company. After graduation he plans to go into production or quality control.

Douglas V. "Doug" Rippy is a twenty-one year old Textile Management major from Clinton, S. C. A Leon Lowenstein scholarship has helped finance his four years at Clemson.

For the past three years Doug has been a member of the Bobbin and Beaker staff and is presently serving as Circulation Manager. He is also serving as Sports Editor of TAPS. Among the other campus organizations of which he is a member are AATT, Arnold Air Society, Phi

Douglas V. Rippy

Psi, Sigma Alpha Zeta, Hall Supervisor, Council of Club Presidents and a CCP Senator.

During summer vacations, Doug has gained first-hand experience in the textile industry. This work experience includes one summer with Clinton Cotton Mills, Clinton, S. C., and one summer with Landrum Mills, Landrum, S. C.

After graduation he plans to enter graduate school.

By
Henry M. Poston, TM '65

Reggie Lane "Bud" Smith is a married student twenty-one years old and is majoring in textile management. He, his wife and their four-year old son are living in Anderson, S. C.

To aid with his college expenses Bud received a J. P. Stevens scholarship for two years and a Leon Lowenstein Foundation scholarship for four years. He has received honors for every semester and high honors for two semesters. He is also a member of Phi Psi, the national honorary fraternity.

Bud has worked full time with the Orr-Lyons Mills, in Anderson, S. C., since August 1958. He has gained valuable experience in every department from the opening room to the weave room.

After graduation Bud would like to go into production, staff, or design.

Reggie Lane Smith

Thomas D. Efland

Efland Appointed Associate Dean

By
Marshall White, T.C. '65

Mr. Thos. D. Efland is the new Associate Dean and Director of Research for the School of Industrial Management and Textile Science. Mr. Efland is also Professor and Head of the Yarn Manufacturing Department. In 1949 he received a Bachelor of Science degree in Textile Management from North Carolina State College and in 1956 received a Master of Science degree from Georgia Institute of Technology in Textile Technology.

Mr. Efland consults and advises on all problems relating to knitting and yarn manufacturing, or preparation in the Textile Research Department. In addition, he has acted as a private consultant on knitting and related subjects and knitting patents.

Before coming to Clemson, he was instructor of knitting at North Carolina Vocational School in Belmont. Mr. Efland is a former Consulting Technical Editor for "Hosiery Industry Weekly" and for the "Knitter."

Recently, Mr. Efland returned from a two-weeks trip to the Textile Machinery Exhibition in Hanover, Germany. On the trip he also visited the School of Textiles in Leicester, England; Shirley Institute in Manchester, England; Danish Textile Institute in Copenhagen, Denmark; research laboratories in Zurich, Switzerland; and the Institute of Textiles in Paris, France.

Mr. Efland lives at 304 Tamassee Drive in Clemson. He is married and has two boys and a girl.

Seminar Hi-Lights

By
Gary A. Hall, TS '64

The curriculum of each student at Clemson who is majoring in either Textiles or Industrial Management is highlighted by a seminar course that is offered to him. The seminars are offered in two courses. The industrial management seminar is offered to all students seeking a degree in Industrial Management, and the textile seminar is offered to all textile seniors, and all other students (textile and industrial management), the faculty of the School of Industrial Management and Textile Science, research personnel and others are invited to attend.

The speakers are composed of outstanding men of the business world. These high executives are invited to discuss problems of mutual interest with our students. There will be at least one of the business offlcals speaking to textile seniors each week of this fall semester. There will be six men speaking to the Industrial Management students throughout the year.

The fields of the businessmen are widespread throughout business and industry, and their duties range from research directors to the directors of hospitals. This wide variety allows the student to become acquainted with each aspect of the business world.

It is certainly a privilege for the Clemson student to have such outstanding speakers in his midst. There are very few places one could hear such a group of proven businessmen at such convenience.

There are a total of twenty speakers who will speak or have already spoken this year.

The textile seminars are as follows:

September 24th—Mr. William C. Little, Jr., Industrial Relations Department, J. P. Stevens & Co., Inc., "Recruiting of College Students."

October 1st—Mr. F. H. Martin, Research Director, Springs Cotton Mills, "Mill Modernization and Expansion."

October 8th—Mr. E. R. Higgs, Senior Research Engineer, Saco-Lowell Shops, "New Development in Yarn Mill Processing Machinery."

Mr. Herman Jones, Research Engineer, Saco-Lowell Shops, "The Spinning Mill of the Future."

October 15th—Mr. James P. Kinard, President, Glen Raven Mills, Inc., "The Marketing of Textiles."

October 22nd—Mr. Gaston Jennings, Divisional General Manager, J. P. Stevens & Co., Inc., "Ethics in Business."

October 29th—Mr. J. D. Mashburn, Director Fiber Utilization Dept., Deering Milliken Service Corporation, "Waste Utilization and Control."

November 12th—Mr. Weddie W. Huffman, Industrial Relations Manager, Burlington Industries, Inc., Community and Employee Relations."

November 19th—Mr. E. W. Marshall, Personnel and Safety Director, Reeves Brothers, Inc., "Government Agencies and the Mills."

November 26th—Mr. Jim Elmore, Personnel Manager, Albany Felt Company, "Industrial Fabrics."

December 3rd—Mr. Thomas D. Efland, Director of Research, Head of Yarn Manufacturing Department and Associate Dean, School of Industrial Management and Textile Science, Clemson College, "The Hanover Textile Machinery Show and European Tour."

December 10th—Mr. William E. Reid, President, Riegal Textile Corporation, "Redistribution of Our Exports."

December 17th—Mr. Allen W. Taylor, Vice President, Burlington Industries, Inc., "New Developments in Synthetic Finishings."

January 7th—Mr. Frank H. Cunningham, Piedmont Cotton Company.

The following will speak to the industrial managements students:

October 10th—Mr. George M. Williams, Assistant Vice President, Southern Railway Co., "I've Been Working on the Railroad."

October 31st—Mr. A. B. Robertson, President, Crawford and Company, "What Business Expects of the College Graduate."

April 30—Mr. Brown Mahon, Chairman of the Board, Carolina Federal Savings and Loan Association of Greenville, "Community Responsibility."

To be announced: Mr. J. E. Fitts, President, Colonial-Hites Company, "The Opportunity Is Still There for the Small Business Man."

To be announced: Mr. E. H. Seim, General Manager, Mecarta Division, Westinghouse Electric Corporation, "Management in Today's Business World."

Notes from the Dean

More than 100 industrialists returned to the Clemson campus during the summer to attend courses conducted by the School of Industrial Management and Textile Science in Textile Chemistry, Supervisor Development, Fabric Development, and Yarn Manufacturing. Thirty-seven firms were represented from five states and three foreign countries. We are planning to expand this program, and any suggestions you can let us have about the type of courses to be included will be appreciated. We think this continued education program is one of the best ways we can serve industry.

Tom Efland, Director of Research and Associate Dean, has returned from a two-weeks tour of textile educational facilities in Europe and a visit to the Textile Machinery Exhibition in Hanover, West Germany. Among the institutions visited were: Leicester Technical College, Manchester College of Science and Technology, The Shirley Institute, University of Ghent, The Danish Textile Institute and L'Institut Textile de France. This educational tour was made possible by the J. E. Sirrine Foundation.

Another first for Sirrine Hall—The distaff side has taken over the personnel management course. Mary Claire Griffin is a native of Lynchburg, South Carolina, graduated from Winthrop and received her Ph.D. at Ohio State. She comes to Clemson from the University of Illinois. Mr. John Wannamaker, another native from Orangeburg, comes to us from L.S.U. He received his M.A. from the University of South Carolina and is in the process of completing his Ph. D. requirement at L.S..U. — major field— accounting.

The lights are burning late in Sirrine Hall as faculty and students pursue their research. The graduate students in Textile Chemistry and Industrial Management are an impressive group. You can expect us to extend our offering in graduate work in the immediate future as our staff continues to emphasize both teaching and research. We do not intend to look upon such as separate areas or separate staff.

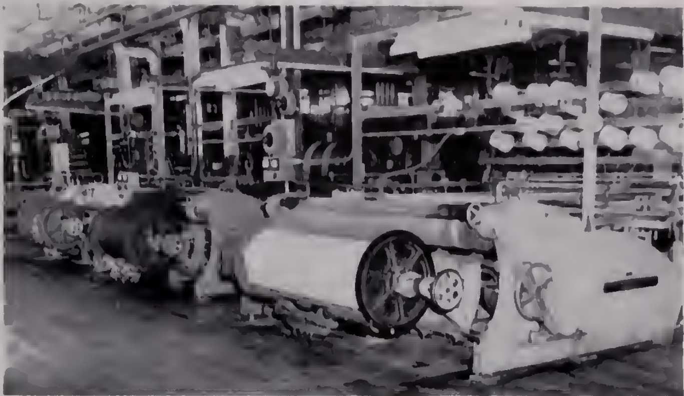
The faculty is very active in many professional organizations. Papers delivered recently are too numerous to mention. Professor Hubbard and four of our students recently attended the Walter F. Fancourt Memorial Seminar in Greensboro, as guests of the W. F. Fancourt Company. The South Carolina Division of the Southern Textile Association met here on October 5. Rodger Hughes, the chairman, informs me "The arrangements made by you, Betts Wilson and John Wigington, and the participation of the faculty (one for each technical group) made this one of the most successful meetings that we have ever had." We enjoyed having them—all 400 plus.

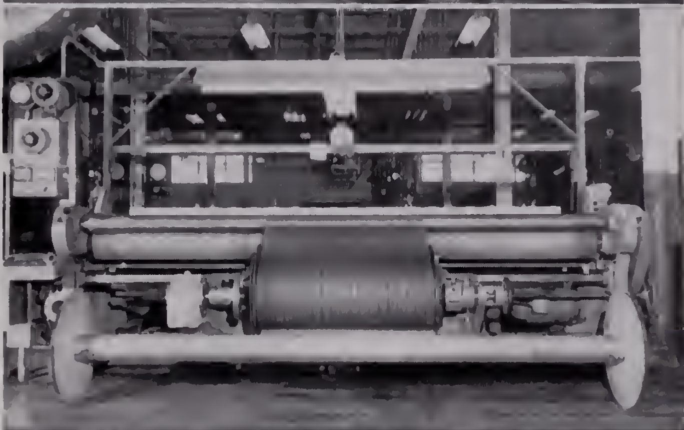
For years our professors have consulted and worked with industry. For example, Dr. Porter worked with the Lyman Finishing and Printing Company this past summer. The seminar and visiting lecture programs of this school are well known. This statement by Clarence Randall sums up our philosophy on this subject, "Wise is the businessman who seeks the company of scholars. Wise also is the scholar who seeks the company of businessmen and foresights the institution of higher learning which invites them to visit its academic halls"—This two way street has a new twist—one of your folks, Clyde Simmons, is a part time lecturer for us this year, helping out with a graduate course in Managerial Policy, each Monday night.

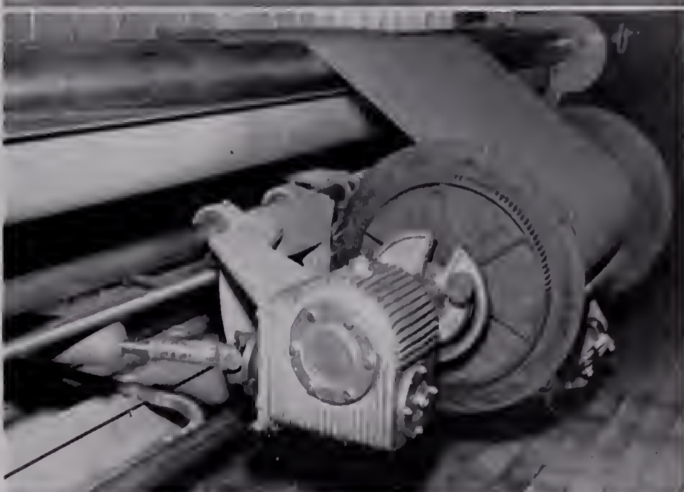
The students in this school are cooperating nicely regarding our ground rule that coats and ties should be worn. One mother wrote, "I think this is the nicest think I've heard about Clemson recently, and I endorse it completely."

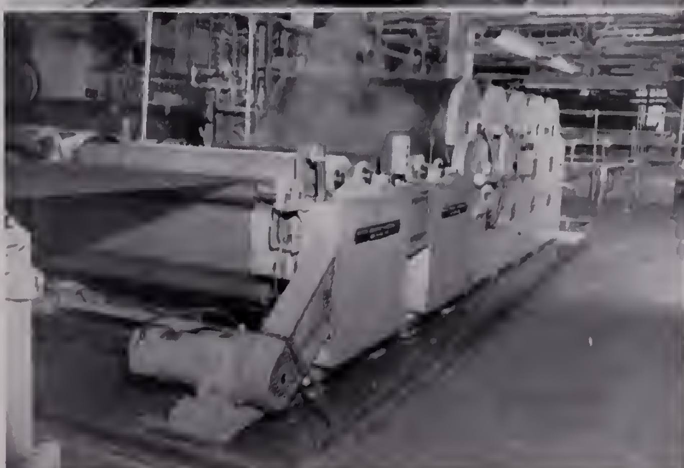
We are certainly pleased to report that Dean and Mrs. Gage are finally at home in Clemson and after a hectic summer, as a result of the automobile accident—are both beginning once again to share their warm personalities with many friends and admirers.

—Wallace D. Trevillian









THE COCKER GH SLASHER

VERSATILE EFFICIENT

Shown here are several views of part of a Cocker 9 cylinder GH Slasher installation at Swift Manufacturing Company, Columbus, Ga.—one of America's most versatile mills. These slashers operate on Acetate, Rayon, Nylon, Cotton and blends—stripes, solid colors, as well as greige goods.

The second picture demonstrates the extreme flexibility of the Cocker GH Slasher—accommodating beams from 36 inches to the 128 inch beam shown in front of the machine—with no projecting spindles. Note also, the convenient control panel.

Shown clearly in the third picture is the revolutionary Cocker Torque Tube Drive* which eliminates troublesome belts, chains, sprockets, etc. This greatly reduces maintenance and simplifies changing beam widths.

The lower picture shows the cylinder section and two Model DA Size Boxes.

Due to especially heavy warp construction, maximum speeds on this particular installation are approximately 100 yards per minute. In other mills, Cocker GH Slashers are operating at speeds up to 184 yards per minute on lighter constructions.

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WORLD'S LARGEST DESIGNERS AND BUILDERS OF COMPLETE WARP PREPARATORY EQUIPMENT

Clemson Delegates Attend Fancourt Seminar

The Second Annual Walter F. Fancourt Memorial Seminar, held at the W. F. Fancourt Co., 408 Banner Ave., Greensboro, N. C., on October 3 and 4., 1963, brought together some fifty students and factulty representatives from Carolina colleges to hear top-flight textile executives discuss the many aspects of their huge and complicated industry.

Established by John L. Fancourt, president of the Fancourt Company, producers of textile chemicals, in memory of his father and older brother, the seminar was designed to offer guidance to young people who intend to make their careers in the textile industry. To accomplish this end, leading men in the field were asked to discuss not only the technicalities of their specific interests but also the future of the industry as a whole and the promise it holds out to young people.

Principal speaker at the annual banquet held the night of October 3 was Felix A. Buskey, president of Althouse Chemical Co., Division of Crompton and Knowles, Inc. His subject was "Textiles, an Aroused Giant."

Herbert A. Stauderman, of the **American Dyestuff Reporter** served as the toastmaster.

Production and shipping are reviewed by John L. Fancourt (2nd from right), president of W. F. Fancourt Co. to Clemson students and faculty (l. to r.) Prof. J. C. Hubbard, Jr., Michael R. Prater, Hoyt Ray Martin, Jimmy Bert Queen, and William E. Barrineau, held at Greensboro, N. C. Plant. Seminar also included plant visits to P. H. Hanes Knitting Co., and Hanes Hosiery Mills in Winston-Salem, N. C.

The seminar began October 3 at 1:30 with a talk by Robert J. Froeber, executive vice president of Hanes Hosiery Mills, Winston-Salem, N. C., on sales and promotion of hosiery.

He was followed by Frank H. Dunn, sales manager, Special Brands Division, P. H. Hanes Knitting Co., also of Winston-Salem, who discussed sales and promotion of Knitted Underwear and Kindred Lines.

On Friday, October 4, the seminar moved to Winston-Salem, where it first visited the Cloth Manufacturing Division of the P. H. Hanes Knitting Co. for an on-the-spot discussion and demonstration of manufacturing, quality control, research and development, and dyeing and finishing.

Following lunch at Hanes Hosiery Mills Co., a discussion on similar aspects of the hosiey business was conducted by Robert E. Elberson, vice president, Manufacturing, and James E. Gibson, vice president of Manufacturing Services.

Participating in the Seminar were students and faculty members from the following colleges and universities: Belmont Abbey, Catawba, Clemson, Davidson, Duke, Elon, Guilford, High Point, North Carolina State, University of North Carolina, University of South Carolina, and Wake Forest.

Clemson's delegates included: Mr. J. C. Hubbard, Associate Professor of Weaving; William E. Barrineau, a T.M. major from Lake City, S. C.; Jimmy B. Queen, an I. M. major from Gaffney, S. C.; Randy Prater, a T.C. major and Ray Martin, an I.M. major, both from Seneca, S. C.

* * * * *

John—"What did you do with my shirt?"
Roommate—"Sent it to the laundry."
John—"Ye gods! The whole history of England was on the cuff."

Sirrine Foundation Aids Bobbin & Beaker

Not many people realize the amount of support given to the Bobbin and Beaker and the Textile Department by the Sirrine Foundation. Because the magazine is distributed free, returns from advertising do not always cover our expenses. In 1953 the Sirrine Foundation board of trustees came to our aid by agreeing to underwrite costs not covered by advertising and to pay modest honorariums to senior staff members. Needless to say, without this support the Bobbin and Beaker would have "folded" some years ago.

The Textile Department benefits from the generosity of the Sirrine Foundation. This aid includes: (1) enhancement of the state retirement for textile staff members; (2) enhancement of the college travel funds to aid professors in visiting textile plants; (3) to employ professors to work on research during the summer months; (4) annual contributions to our textile library for employing a librarian and providing funds for the purchase of many books which would not otherwise be available.

Both the Bobbin and Beaker staff and the Textile Department offer their heartfelt thanks to the Sirrine Foundation for their valuable contributions.

A BATTLE SCIENCE LOST

The past few years have been an undeniable age of science for the textile industry.

Millions of dollars have been spent to develop new fabrics and the high-speed precision machinery to produce them; dyes for a rainbow of colors that neither fade nor run; finishes which seem to improve with age, and carefully-researched sales campaigns to attract customers to new and more exciting products.

Every penny of the investment has been worthwhile. The American textile industry today represents one of the most modern and progressive industries in the world.

Yet, an inferior type of cloth produced by hand with second-rate materials under the most primitive conditions imaginable is proving that the human element still plays an important role in shaping the fast-moving world of fashion.

The cloth that defies progress is "bleeding madras."

Madras originated in India, but production of madras-type cloth is almost world-wide. Bleeding madras, however, remains practically untouched by modern methods. It is woven in individual lots, with no continuity of pattern and with almost every human flaw possible in individual pieces of hand-made cloth. Dyed yarns are used for both warp and filling, but the yarns are colored separately with natural dyes which bleed and run when the cloth is washed. Finally, madras is lighter and less durable than machine-produced cloth turned out under the exacting conditions of the modern textile industry.

In other words, by the usual standards applied to the fabric and apparel trades, madras is doomed to failure.

There are times, however, when fashion combines with the unpredictable nature of textile customers to turn weaknesses into strengths. This is what has happened with madras.

People who would ordinarily demand fabrics which are durable, shrink-proof, run-proof, color-fast and new have become unaccountable fascinated by madras, especially the primitive natural colorations. The constantly changing patterns of madras have become the basis for the fabric's popularity in sportswear, dresses, men's coats and dinner jackets, hair bows, belts, neckties, kerchiefs, pocketbooks and watch bands.

This "human element" in the popularity of madras and other so-called fashion items is proof, textile sales experts say, that no industry or company has a "patent on progress" and that progress has no patent on popularity. In fact, the experts add, it re-emphasizes that a successful textile organization today must include the kind of people who have not only a well-developed sense for scientific thinking but, also a keen sensitivity for fashion and style.

"The element of fashion," the fashion apparel merchandising manager of a leading department store chain said recently, "continues to be a dominant factor in serving the American public." This requires, he suggests, that a successful company must have and keep modern production facilities, management personnel bold enough to face challenges quickly, and, perhaps most important, production personnel who can adjust to the needs of their company, the textile industry and the textile market.

HIGH FLYING FABRIC

A fabric that is glued together instead of stitched is being regarded as the next step in the continuing development of flight uniforms for Naval aviators and possibly astronauts.

The fabric is made from polyurethane, one of the newer man-made fibers. Tests to date indicate that it offers good comfort qualities and high abrasion resistance, although the fact that it can be put together with adhesives is one of its major selling points.

Coated nylon now used in flight suits is considered good material for high altitude flight suits, but it has to be stitched together. The stitches themselves are fortified with cement and seams are strengthened with sealing tape, but they are still considered weak points in flight suit construction. It is possible for them to leak, thus reducing the inside pressure of modern flight uniforms.

Of special interest to the Navy is the thinness of polyurethane fabric. This allows an exceptional amount of flexibility, which scientists point out is of increasing importance to high-altitude fliers. The scientists add that flexibility has not been of particular importance to astronauts thus far, since there has been little need for them to be mobile.

However, this will not be true in the future, as space craft and other high altitude vehicles become larger and instruments cannot be placed within easy reach. Also, future high altitude and space flight crews will be expected to walk around within their vehicles and, possibly, outside them.

Polyurethane is also being tested as a lining for flight gloves and as an inner collar to prevent a flight suit from flooding if a pilot is dumped in the water without his helmet.

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In This Issue

The BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Industrial Management and Textile Science.

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

from the Editor

We are fortunate in having a very informative article on "Cost Indexes" by Professor Norbert L. Enrick of the University of Virginia. We think you will also find the list of facts concerning the textile industry in North and South Carolina to be most interesting.

S.O.S.—The Bobbin and Beaker is operating in the "red". Won't you please join our small list of faithful advertisers and help us produce a higher quality magazine for our 2700 readers?

SENIOR STAFF

Seated left to right:
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Doug Tucker,
Jerry Blackwood.

Standing:
Gary Hall,
Doug Rippy.

COST INDEXES

Norbert Lloyd Enrick
University of Virginia, Charlottesville*

A graduate of and professor at the University of Virginia, Dr. N. L. Enrick has been active in the application of quantitative methods to the solution of textile management problems for over a decade, having been consultant for over a hundred mills.

Among his publications are several books, the latest of which, MANAGEMENT CONTROL MANUAL FOR THE TEXTILE INDUSTRY, was just published by Rayon Publishing Corporation, 303 Fifth Avenue, New York 16, N. Y.

Norbert L. Enrick

For many reasons, it is undesirable to permit data on mill costs to be distributed widely within a mill or even among mills within a textile organization. Yet, cost data can be of value in spotlighting places within a mill where excessive costs are arising. The problem therefore is to use cost data without showing any dollar-and-cents figures. A simple device, used in the field of economics, the Index Number, accomplishes this objective.

METHOD

A simple mathematical formula will convert monetary to index figures. It reads:

Index = 100 x Actual Cost/Base Cost

The base is usually a standard, adopted by management after considerable study. It may be the lowest cost considered feasible, which is selected as the base; or it may be the cost actually being attained in a good mill set-up, or it may be a similar value considered useful for comparative purposes. Assume for example, that a standard or base figure of half a cent has been established for carding production per pound, and that an actual cost of 0.6 cents per pound has been observed in a mill. Then the Cost Index becomes:

Cost Index = 100 × 0.6/0.5 = 120.

Since the Index is 20 points above 100, it signifies that actual cost (0.6¢) is 20 per cent above the base selected as a standard of comparison (0.5¢). Now, if the actual cost observed had been 0.4 cents per pound, then we would have said:

Cost Index = 100 × 0.4/0.5 = 80

Therefore, the Index shows that actual cost is 20 percent better than the standard or base, since the Index value of 80 is 20 points below the 100 mark.

The Index thus shows pertinent cost relationships, indicating where costs may be too high, but does not reveal the actual dollars and cents involved. Aside from this, Index figures reveal percentage differences at a sight, thus providing a consistent gauge of the magnitude of difference involved.

PRACTICAL APPLICATION

An illustration of the practical application of Cost Indexes is provided in Table 1, showing data for four mills within a group, for their 30's and 40's yarns. In this particular example, Mill A having the lowest overall costs was selected as the base-cost mill. The Index figures for Mills B, C and D are thus data developed with Mill A's costs as the base.

Examining the data, it is noted that there are considerable differences in labor costs, which were found

*Dr. Enrick is associate professor at the Graduate Business School.

Table 1

YARN COST VARIATIONS IN FOUR MILLS

Mill	30's Warp Yarn				40's Filling Yarn			
	A	B	C	D	A	B	C	D
1. Labor								
Opening-Picking	100	129	200	307	100	129	200	307
Carding	100	124	145	126	100	124	145	127
Drawing	100	150	150	160	100	150	150	160
Roving	100	123	177	283	100	149	176	227
Total	100	129	161	198	100	137	161	181
Spinning	100	116	119	199	100	117	124	202
Total	100	121	134	199	100	123	134	197
2. Cotton								
Raw Stock	100	99	101	91	100	99	106	96
Yarn	100	99	101	92	100	99	106	97
3. Cotton Plus Labor (#1 + #2)	100	101	104	102	100	102	109	112
4. Ends-Down Per 1000 Spindle Hours	14	15	15	42	30	31	15	52.5
5. Front Roll Speed								
R.P.M.	138	148	138	140	140	140	135	132
F.P.M.	36.1	38.7	36.1	36.7	36.7	36.7	35.3	34.6
6. Construction Data								
Hank Roving	1.00	1.30	1.10	1.00	1.30	1.25	1.35	1.40
Yarn Number	31	31.5	30	31	41	42	40	42
Twist Multiple	4.25	4.22	4.28	4.20	3.90	3.63	3.78	3.84

* These lines excluded in obtaining Line 5.

to be attributable to differences in equipment, differences in running conditions, and differences in effectiveness of machine assignments and operating standards. It is of particular interest that Mill B, with relatively cheaper cotton than A, was yet able to maintain low ends-down rates, but at the cost of a relatively expensive fine roving. Many other interesting relationships become apparent from a review of the Indexes for the mills.

It must be realized, of course, that cotton is still a major part of yarn cost, and the comparative percentages in Table 2 serve to emphasize this point. When considering labor, cotton, overhead and waste in producing a 30's yarn, from 74 to 80 per cent of total cost is the cost of the cotton! For a finer yarn, such as 40's filling, the figures show a lower proportion of cotton cost. Therefore, the potentials of cost reduction in a mill become greater with finer yarns.

CONCLUSIONS

From analysis of Index numbers, such as the ones shown here, a mill can compare its own cost figures against other pertinent data, and spotlight areas where intensive cost reductions may be most profitable. The following are some areas that have come to light in such investigations:

1. **Raw Stock**

   Quality control testing and judicious blending, coupled with good opening room practices in general, will result in lower purchasing costs of cotton. yet yield better running conditions and yarn quality.

2. **General Industrial Efficiency**

   The efforts of the Standards Department in effecting proper preventive maintenance of equipment, assuring good labor and machine standards, and controlling quality will reflect themselves in lowered labor costs, less waste, but slightly higher overhead reflects the increased planning and control activities, such as time study, maintenance, testing inspection, materials checks, and the like.

3. **Equipment**

   Outdated equipment or modern equipment that is not kept in best condition will not aid in keeping costs at a minimum. Labor costs and waste data will reflect the age and state of condition of equipment.

So many factors interact in any cost situation, that it is difficult to pinpoint individual causes for excess costs. However, a mill that is aware of higher-than-standard costs—where the standard is the Index base or other goal set by management—will gradually be able to work at and whittle down undue costs. More-

over, the same improved running conditions that mean lower costs also mean better quality—less bad work is being produced. The improved product is thus a more saleable product.

The Cost Index is a management tool in providing cost data to supervisors and others concerned in a simple manner, providing comparisons that should serve as the incentive to improve on costs throughout the mill.

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Table 2

COMPARATIVE YARN MANUFACTURING COSTS WITHIN EACH MILL, EXPRESSED AS A PER CENT OF TOTAL COST.

	30's Warp Yarn				40's Filling Yarn			
	A	B	C	D	A	B	C	D
1. Labor Cost								
a. Opening-Drawing	2	3	3	3	2	3	3	3
b. Roving	1	1	2	3	1	1	2	2
c. Spinning	5	6	6	11	8	9	9	15
d. Total*	8	10	11	17	11	13	14	20
2. Cotton Cost								
a. Baled	72	69	71	66	68	66	67	62
b. Yarn*	80	77	78	74	75	73	74	69
3. Overhead	12	13	11	9	14	14	12	11
4. Waste	8	8	7	8	7	7	7	7
5. Total	100	100	100	100	100	100	100	100

* These lines excluded in obtaining Line 5.

Courses For Professional Development

Courses for Professional Development, a Clemson College program for the advancement of industrial personnel, begins its seventh annual schedule of classes this summer in the School of Industrial Management and Textile Science.

A catalog with complete details, including application forms, will be available in April. All requests for these should be addressed to Professor C. V. Wray, PD program coordinator, Sirrine Hall, Clemson College, S. C.

Since the program's start in 1958, more than 400 persons in various branches of industry from several states and foreign countries have completed courses. Some plants send students regularly. Special lectures in social sciences and the humanities will be included this year.

All courses run for two weeks, except introduction to textile manufacturing, dyeing and finishing, which meets July 6-10 and is primarily for vendors to the textile industry. The following will be taught during June 15-26.

Yarn Manufacturing is planned for college graduates other than textile majors who have selected a career in textiles and for high school graduates employed in textile plants who have attracted the attention of management as prospects for advancement. The course will be repeated July 6-17.

Supervisor development is offered in cooperation with the Greenville Chapter, Society for the Advancement of Management. It is designed to meet the needs of both supervisors and potential supervisors in any type industry. The course will be repeated July 6-17.

Methods Analysis and Time Study, given in cooperation with the Southern Textile Methods and Standards Association, presents both basic motion and time study principles as well as the latest techniques in the work measurement field, and is especially for textile industry trainees.

Quality Control, to be taught in cooperation with the Palmetto Sub-Section of the American Society for Quality Control, is open to persons in any industry desiring to learn more about quality control methods and techniques.

Basic Textile Chemistry will be offered from July 20-31, to be followed by Advanced Textile Chemistry from Aug. 3-14. Both courses will be part of another cooperative project with the Palmetto Section of the American Association of Textile Chemists and Colorists. They will add to the knowledge of persons interested in chemistry as applied to the textile industry.

A person may enroll in only one course at a time, with classes conducted from 8:30 a.m. until 4:30 p.m. Monday through Thursday and a half-day session on Friday. There is no entrance examination and no College credit given. All classes will have several instructors and most will be held in air-conditioned buildings.

Outstanding Seniors . . .

By
Terry Ivester, T.C. '66

DOUGLAS D. RICHARDSON

Douglas D. Richardson, a twenty-one year old Industrial Management major, is a native of Lexington, South Carolina. He has been an honor student four semesters at Clemson.

Doug is a member of Blue Key, Who's Who, Pershing Rifles, Scabbard and Blade, Phi Eta Sigma, Phi Kappa Phi, Student Senate, Student High Court, and Tiger Brotherhood. He also serves as president of the Inter-Fraternity Council and Kappa Delta Chi Social Fraternity.

During the summer, Doug gained valuable experience in his major field by working as a time study engineer for Columbia Products Company in Columbia, South Carolina. After graduation he plans to go to graduate school or go into marketing with Humble Oil Company.

Frederick C. Craft is a twenty-one year old Industrial Management major from Winnsboro, South Carolina. He is a member of the tennis team and he has received a half scholarship from the Clemson Athletic Department.

While at Clemson, Fred has been active in the Block "C"

FREDERICK C. CRAFT

Club, the Industrial Management Society, and the Society for Advancement of Management. He is also a member of the Tiger sports staff, and he has received honors for every semester.

Fred is still undecided about his plans after graduation.

Michael Randolph Prater is a twenty-one year old Textile Chemistry major from Seneca, South Carolina. He has received a Ciba Scholarship to help with expenses at Clemson.

Michael is an active member of the Phi Psi Fraternity and the American Association of Textile Chemists and Colorists. He is presently serving as president of AATCC and treasurer of Phi Psi. He is enrolled in the Army ROTC and serves as a brigade executive officer. He is also a Distinguished Military Student.

After graduation, Michael plans to enter graduate school, but is still undecided upon the institution.

MICHAEL R. PRATER

HOYT RAY MARTIN

Hoyt Ray Martin is a twenty-one year old married student majoring in Industrial Management under the textile option. He and his wife, Sara, make their home in Seneca, South Carolina.

Ray has been working full time to help with his expenses at Clemson; therefore he has had very little time for student activities. However, he has been an honor student for five semesters. He was also a delegate to the Walter F. Fancourt Seminar in Greensboro, North Carolina.

During the summer vacation, Ray gained valuable experience by working for the J. P. Stevens Company. He has also worked for the past four years as a salesman at the Western Auto Store in Seneca, South Carolina.

After graduation, Ray would like to go to work for a textile firm but he is still undecided about the type of work he wants to do.

Jerry D. Burton, a twenty-one year old textile management major, is a native of Calhoun Falls, South Carolina. To aid with his college expenses, he has received a Ben and Kitty Gosset scholarship.

While at Clemson, Jerry has been active in the Numeral Society, Phi Psi Fraternity, and the Tiger Brotherhood. He was also a varsity cheerleader for two years and a class senator during his junior year. He has received honors for two semesters.

JERRY D. BURTON

During summer vacations, Jerry has gained valuable experience in the textile industry by working five summers with Burlington Industries and one summer with Bigelow-Sanford Woolen Mills. Both of these mills are in Calhoun Falls, South Carolina.

Jerry is currently enrolled in ROTC and is participating in the Army Flight Program. After serving a three year tour of duty, he plans to take a position with Burlington Industries.

Charles Ervin Fousek is a married student majoring in Textile Management. He, his wife, and their three children are presently living here in Clemson, South Carolina.

To aid with his college expenses, Charles received a Leon Lowenstein Foundation scholarship for four years and a South Carolina Textile Manufacturers Association Scholarship for two years. On campus, he is a member of the American Association for Textile Technology and PHI PSI, the national textile honorary fraternity.

Charles has worked full time with the Orr-Lyons Mills in Anderson, S. C., since 1954. He has gained valuable experience as a weaver and as a loomfixer. At the present time, he is working in the standards department. He served three years in the Air Force before he began working with Orr-Lyons. After graduation, Charles would like to go into production in the weaving department.

CHARLES ERVIN FOUSEK

Notes from the Dean...

A doctoral program in chemistry with a major emphasis on textile chemistry was jointly announced recently by the School of Arts and Sciences and the School of Industrial Management and Textile Science. It combines the extensive theoretical studies of the Chemistry Department with the more specialized work of the textile chemists in a cooperative interdisciplinary program. The graduate degree will be a Ph.D in chemistry with a major in textile chemistry. This is certainly our most significant curriculum development this year. Two or three graduate students are expected to be enrolled in this program by the fall of 1964. Candidates for the doctorate in this field will pursue course work in theoretical chemistry. Their research will be combined with some facets of chemistry, which probably will suggest significant application to the textile industry.

The first Master of Science degree in Industrial Management was awarded to Roy Allison Dalton at the February commencement. Mr. Dalton has accepted a position with Fieldcrest Company in Spray, North Carolina. This graduate program in management has attracted wide attention and students from many sections of the country are seeking to participate. Enrollment will continue to be very selective. Engineers in the upper 20% of their class are encouraged to apply.

This school, in cooperation with International Business Machines representatives, is offering an advanced textile finishing class to a select group of I.B.M. employees during February. This is the second time Clemson has been selected by I.B.M. for courses in professional development. Remember—the regular summer program for professional development courses will be expanded this year. The catalog describing the 1964 courses will be available in April. Professor C. V. Wray is the cooordinator.

Professor J. C. Hubbard is the special adviser to those undergraduate students who are majoring in industrial management and who select textiles as a "secondary concentration." For the I.M. student, secondary concentration simply means the student can select 12 hours work in one of eight subject matter areas, such as textiles, finance, regional analysis, etc. Professor Hubbard reports about 35 students in the textile concentration. Special textile courses have been developed for this group. Since these students make this selection at the beginning of their junior year, (a somewhat mature decision), it is believed that all of them most likely follow a textile career. We will watch their career with interest.

Dean Gage was honored on February 20 with a dinner at the Clemson House. It was a delightful occasion. The J. E. Sirrine Foundation presented the dean a beautiful silver tray on which was inscribed:

Presented To

Dean Gaston Gage

For Able and Dedicated Service

both as Dean of the

Clemson School of Textiles and to the Foundation

By

The J. E. Sirrine Textile Foundation, Inc.

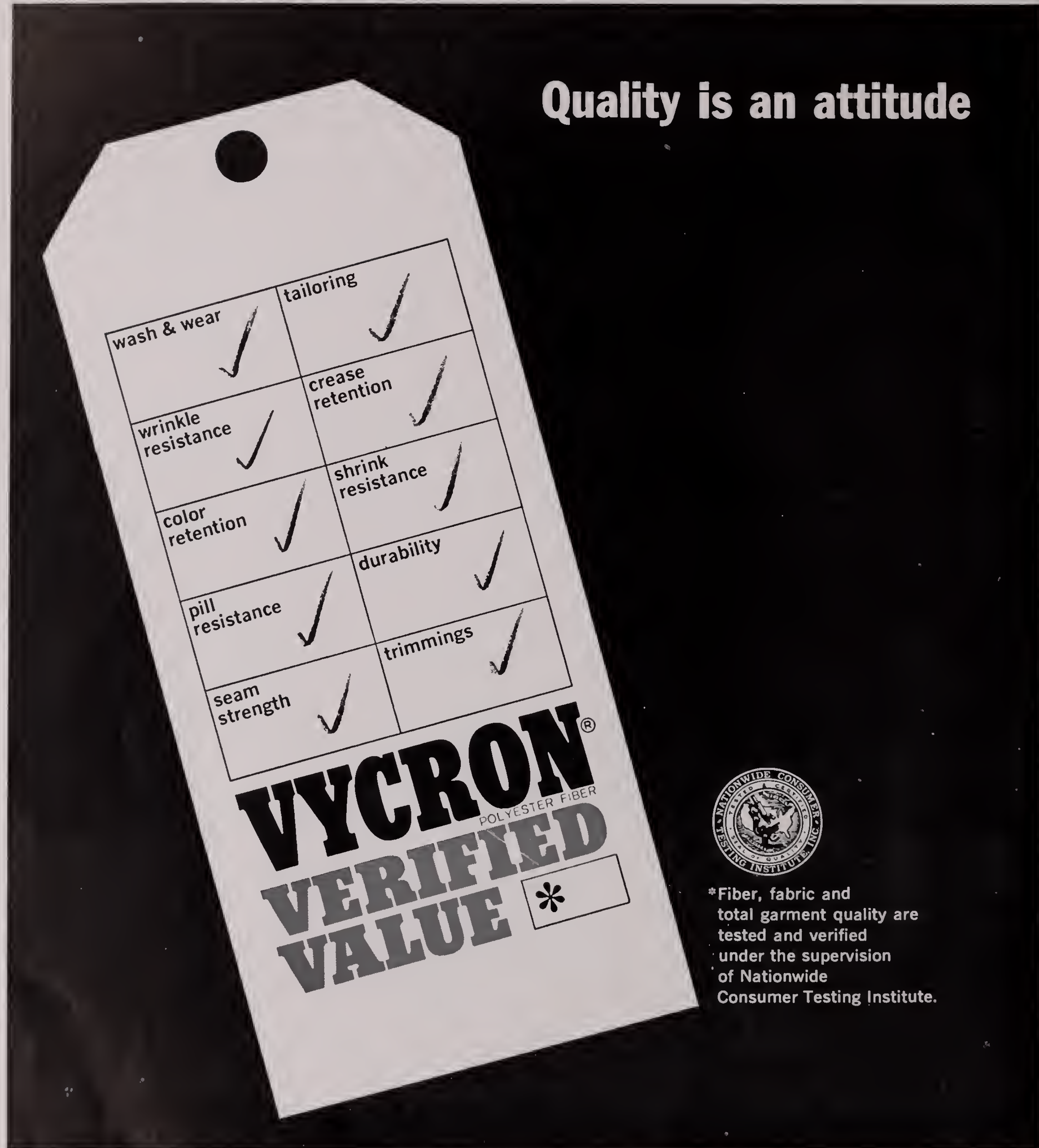
January 1964

Mr. Earle Stall, President of the Sirrine Foundation, made the presentation. The faculty and staff presented the Dean Emeritus with a beautiful T.V. set. All were so pleased to see both the Dean and Mrs. Gage in such fine spirits.

We continue to be proud of the appearance and manners of our students. To some, such training may sound old fashioned but we think this "part" of their education is still very important.

We are looking forward to the joint meeting of the A.T.M.I. Education Committee and the National Council for Textile Education, which will be held at Clemson on March 10, 11, 12.

—Wallace D. Trevillian



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A A T T Hi-Lights

By
James Glasgow

The American Association for Textile Technology better known to the student body as A.A.T.T. is an organization to provide the students with an early means of becoming associated with the Textile industry and its policies. A.A.T.T. is a student chapter of a national organization; so that its benefits and opportunities are available to us even after we begin our roles in the business world.

A.A.T.T. has been very active this year. Its total membership is fifty-nine. The student officers are Steve Tucker, Pres., Henry Poston, Vice-Pres., James Glasgow, Sec., Wes Connley, Treas., Fred Hardee, Corres. Sec., Ed Blakeney, Program Chairman, and Gary O'Shields, Publicity. Professor Joel Richardson serves as faculty advisor. A.A.T.T. meets once a month and has varied programs such as guest speakers, films, and demonstrations. This year A.A.T.T. has had two outstanding lecturers—on October 8th Mr. Herman Jones, Research Engineer for Saco-Lowell Shops, spoke on "The Spinning Mill of the Future." On December 3rd Mr. Thomas D. Efland, Associate Dean of the School of Industrial Management and Textile Science of Clemson College, spoke on "The Hanover Textile Machinery Show and European Tour."

One very beneficial field trip this semester included tours of Gayley Mills in Marietta, S. C. and Judson Mill in Greenville, S. C. Our field trips are most important because they offer us practical examples of the principles and techniques that we are taught in class.

A.A.T.T. is a growing Textile organization since its membership is available to all students whose curriculum includes at least one major course in the field of Textiles.

CAROLINA TEXTILES

There are more than 222,000 people employed in North Carolina's 1,077 textile plants. They earn nearly three-quarters of a billion dollars a year.

* * * * *

North Carolina leads the nation in production of textile goods, accounting for almost a fourth of all broad woven cotton goods; more than a third of man-made fiber fabrics and almost 10 per cent of all woolen and worsted goods.

* * * * *

In North Carolina there are 587 knitting mills which employ 68,300 people who produce about 50 per cent of the nation's entire hosiery output.

* * * * *

Michael Schenck organized the first cotton mill of any permanence in North Carolina in 1813 in Lincoln County and is considered the father of the textile industry in the Tar Heel state.

* * * * *

In 1880 there were 49 cotton mills located in North Carolina producing goods valued at $2,500,00 a year.

* * * * *

Textile mills are located in 76 of North Carolina's 100 counties.

* * * * *

Textile mills in North Carolina use over 2,500,000 bales of cotton a year, which is nearly a third of all that used in the United States, and about eight times the amount of cotton produced in North Carolina.

* * * * *

The value of textile products manufactured in North Carolina amounts to well over $3,100,000,000 annually, 3 1/2 times the yearly value of all Tar Heel farm products, including livestock.

* * * * *

Textile plants furnish jobs for 44 per cent of all North Carolina manufacturing workers.

* * * * *

There were 5,747,000 cotton system spindles in textile mills in North Carolina as of June 29, 1963.

* * * * *

The North Carolina textile industry and its employees pay more than $44,000,000 annually in corporate and individual income taxes and in sales taxes. This is almost one-third of the state's total collection from these three sources.

* * * * *

Textile companies in North Carolina pay an estimated $7,000,000 a year to county and municipal governments in property taxes.

* * * * *

The first colored cloth manufactured in the South was made in Alamance County in North Carolina and was known as "Alamance plaids."

South Carolina textile plants last year produced more yards of fabric than any other state, leading the nation in production of cotton fabrics and placing second in man-made fiber and also woolen and worsted goods.

* * * * *

Textile plants of South Carolina consume more than 2,500,000 bales of cotton annually, or about six times the amount of cotton grown in South Carolina.

* * * * *

The 3,989,921,000 yards of cotton broad-woven cloth produced in South Carolina last year constituted 43 per cent of the nation's out-put, highest of any state.

* * * * *

South Carolina was the second largest producer of man-made fiber fabric last year. Palmetto textile plants produced 817,262,000 yards, second only to North Carolina's 879,790,000 yards.

* * * * *

Every new fiber-to-fabric cotton-system textile plant constructed in the United States since the end of the World War II has been located in South Carolina.

* * * * *

The approximately 125,000 textile production workers in South Carolina make up about 60 per cent of the state's entire industrial labor force.

* * * * *

Textile wages in South Carolina amount to 62.2 per cent of the state's entire industrial payroll.

* * * * *

South Carolina last year was the nation's second largest producer of woolen and worsted goods, trailing only Massachusetts, with a total of 39,246,000 yards compared to the leader's 44,998,000 yards.

* * * * *

Because of the two-price cotton system, South Carolina textile plants last year paid $113 million more for the American-grown cotton they consumed than their overseas competitors would have paid for the same American cotton.

* * * * *

One of the first textile plants ever built in South Carolina still stands. The walls of the Graniteville Co. plant near Aiken have been incorporated in its modern successor. The Graniteville plant was built in 1845.

* * * * *

Value of the textile products turned out by South Carolina textile plants during the last fiscal year was $2,350,976,385.

* * * * *

South Carolina leads the nation in number of cotton system spindles in place, with 6,679,00, as compared with 5,700,000 for second place North Carolina as of June 29, 1963.

Review and Outlook

The nation's textile industry has entered 1964 with an optimistic outlook toward 1964 operations, according to the industry's chief spokesman.

President Robert T. Stevens of American Textile Manufacturers Institute (ATMI), in a forecast of 1964 activities, said, "The textile industry appears to have the potential to participate in whatever economic gains are scored by the general economy in 1964, thus benefiting its employees, its stockholders and the nation." Mr. Stevens is chairman of the board and president of J. P. Stevens and Co., Inc., in addition to being the top officer of ATMI, which is the textile industry's central trade association.

Mr. Stevens pointed out that production of textile mill products has been recovering from a low point reached in February 1963. Also, he said, wholesale textile prices have been edging upward since last summer although they are still two or three per cent below prices received during 1960. Industry profits rates are also turning upward, but they aren't expected to be as high as they were two years ago.

The ATMI President emphasized the need for an end to the two-price cotton system by pointing out that the House of Representatives has approved a cotton bill offered by Chairman Harold D. Cooley of the House Agriculture Committee. "The industry is hopeful," Mr. Stevens said, "the United States Senate will respond tc President Johnson's recent request for quick action on the legislation. Elimination of the inequity thrust upon the industry by the government's two-price cotton system continues to be a major need and objective."

The industry is "determined to do its utmost" to overcome the harmful effects of two-price cotton and imports of foreign textiles by continuing a massive modernization program Mr. Stevens said. During 1963, he pointed out, the industry's expenditures for modern plants and equipment were at an annual rate of $638 million. An even higher rate is expected to be established for modernization spending during the first three months of 1964.

Expenditures for new plant and equipment during 1963 was 73 per cent higher than the industry's total profits, Mr. Stevens said. All other industries' profits exceeded their modernization expenditures by 21 per cent.

The total picture, Mr. Stevens said, means that the textile industry has entered a new year of activity "with better prospects than existed 12 months ago, despite inconclusive cotton legislation."

SOUTH CAROLINA — THE PLACE TO GO

From the blue-capped hills of the piedmont country
To the wave-kissed sands on the plains below,

Out where we live in the wide open spaces,
Down where the blessed breezes blow;

Where the cotton fields all bid you welcome
And the textile mills are humming low,

If you really want to do some living,
South Carolina is the place to go!

From the hallowed walls of old Fort Sumter,
Where patriots stormed in the long ago

For the sovereign rights of America's childhood,
South Carolina is the place you know,

To the sacred shrine of John C. Calhoun
Where lives the spirit of devotion of yore

To the things we love in the good old Southland,
South Carolina is the place to go!

Now if you like a bit of Heaven
In a land where the sweet magnolias grow;

Where the honey bees linger on the golden jasmine
And the sparkling streams will always flow;

Where the peaches bloom in perfumed splendor
And the luscious fruit hangs row on row,

And if you really want to do some living,
Then South Carolina is where you'll go!

— A. B. Culbertson, Laurens, S. C.

THE BOBBIN AND BEAKER
Student Publication
School of Industrial Management and Textile Science
Clemson College
CLEMSON, SOUTH CAROLINA

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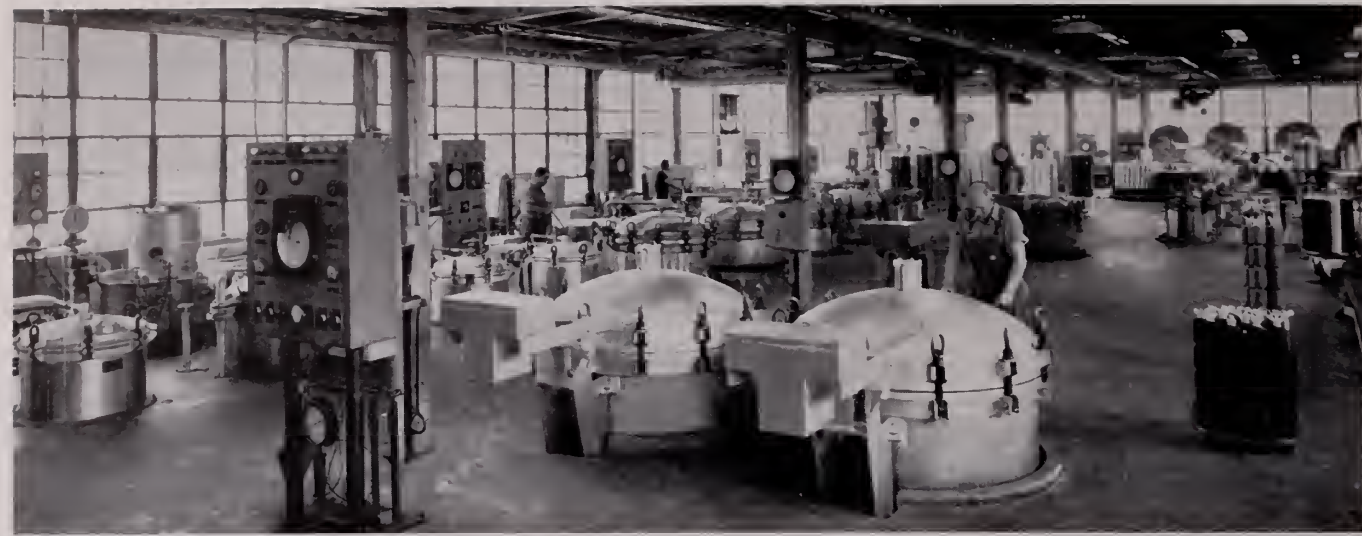

Bleach House Below

Dye House Above

S-C-T SPINNERS MERCERIZERS DYERS BLEACHERS

STANDARD-COOSA-THATCHER COMPANY

A diamond of perfection

To users of combed mercerized yarns and industrial sewing threads the "S.C.T. Diamond" is a well known and highly respected mark.

Through extensive research, exacting quality control and the use of modern machinery, this company produces dyed and bleached yarns that are second to none.

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S.C.T. is one of the few textile companies that maintain package bleach plant completely separated from its package dye house. Both plants are equipped with the very latest designs of dyeing and bleaching machinery.

from the Editor

This, the last issue by the Senior Staff, features an informative article, "Styling and Design". Thanks are extended to Mr. Harris E. Rubin, Executive Vice-President of Burlington Men's Wear, for preparing this article.

The staff urges you to pay particular attention to the information given in "Professional Development Courses" on page sixteen. We believe that this program offers a golden opportunity to all who participate.

SENIOR STAFF

Seated left to right:
Henry Poston,
Doug Tucker,
Jerry Blackwood.

Standing:
Gary Hall,
Doug Rippy.

STYLING AND DESIGN

By
Harris E. Rubin

Mr. Rubin graduated in June, 1950 from the School of Textiles, North Carolina State College with a B.S. degree in Textiles. He was employed 4 years as Asst. Styler for Burlington Industries, Inc., Men's Wear Division, then 3 years as Head Styler for the Synthetic Division of Pacific Mills. In 1957, he organized Tritex Mills, which functioned as sales agents for Reeves Bros. Inc. in men's wear synthetics.

In October, 1960, he returned to Burlington Men's Wear as Executive Vice-President. His present responsibilities include styling and merchandizing.

My approach to this topic will be with particular emphasis on the woven Men's Wear apparel field. It is important to keep in mind however that while I will dwell on Men's Wear styling and design similar relationships exist in most other textile areas—for example, in knitting, women's wear woven fabrics, home furnishings, carpeting, domestics—only in the industrial fabrics area is the emphasis and outlook somewhat different in that function far outweighs most other considerations.

Perhaps the best beginning point for this discussion would be a definition of "Styling". To my mind the textbook definition of styling would be that styling is the esthetic enhancement of a fabric by means of color, pattern, weave, finish, texture, cloth construction, or yarn composition or blend in order to further the saleability of the fabric by satisfying an existing market need or by creating a new area of market interest and desire. Although the styling function is extremely complex in nature, further simplification would give overwhelming emphasis to two primary points—(1) Appeal, and (2) Saleability. In the market place, then, styling is concerned with creating fabric appeal which results in sales at a profit. It works hand in hand with sales and together they form a team commonly known as "merchandising." In any business organization the primary objective is to sell at a profit. Merchandizing is charged with the responsibility for so-doing. Through its sales arm merchandising endeavors to sell its products at the best possible price consistent with good and sound business practices. Through its styling arm merchandising strives to enhance existing products by means of color, hand, pattern, finish, etc. and to create new and desirable products which will result in enlarged, expanded, or completely new markets.

This, styling, working closely with manufacturing and sales, is expected to accomplish within the existing framework of plants and the limitations of equipment in the manufacturing area. When conditions warrant, styling is expected to advance recommendations and ideas for the purchase of new equipment or the modification of existing equipment consistent with anticipated or actual changes in the market place with ultimate consideration given to the profit motive.

Thus, in addition to its functions as a member of the merchandising team responsible for creating for sales, styling in a well managed textile organization is also the "bridge" or primary point of contact between merchandizing and its equally important partner in profit pursuit — manufacturing. Logically, what better organizational set up could be envisioned than that close contact and liaison exist and be enjoyed between those that conceive or create and those that execute and produce, for such are the functions of manufacturing over-simplfied. Just as styling and sales are closely aligned, so we feel that styling and manufacturing are similarly aligned, for complete cooperation, mutual understanding of each others ideas, plans, problems, limitations, is essential in order that common goals be achieved. It is essential that this close contact and rapport exist between

merchandising and manufacturing if an organization is to function, flourish, and grow as a single entity with but one primary motivation—profit. Too often we have seen businesses well staffed, well managed, properly financed, well equipped — in short, with seemingly all the tools at hand for a success, falter and fail to progress and grow because of lack of understanding and a minimum of team-work between merchandising and manufacturing. In our organization styling is expected to enhance, encourage, and help create understanding between merchandising and manufacturing for the total benefit of all concerned.

Thus far we have discussed very briefly in general terms the function and activity of styling with reference to the organization—how styling's purpose is to enhance sales and create profits; that it is an integral member of the merchandising team and as such closely aligned with sales and the customer with ultimate concern, of course, with the consumers needs and wants; that styling is merchandising's liaison with manufacturing and its spokesman and advocate therein; that it, in turn, is expected to have a complete and working knowledge and understanding of manufacturing and its facilities so as to take full advantage of all the tools at hand available to produce saleable fabrics; and, in addition, styling must be well-versed in and aware of industry-wide progress and developments in such areas as fiber developments, new processing developments, improvements in finishing techniques, etc. in order to provide direction and advice for the development and merchandising of new products. For primarily with new products can great strides be made towards increased sales and better profit margins.

In most organizations a competent styler is a merchandiser, a salesman, a fabric development man, a designer, a colorist, and a hand finish critic. For such are the demands of styling for today's men's wear market where synthetics, and synthetics blended with natural fibers have created complicated fiber combinations, blends and fabrics, increasing year-by-year in usage such that day-to-day and week-by-week changes and progress in the synthetic fabric field is unending. Before the advent of synthetics, styling and fabric development was comparatively simple—cotton mills produced a variety of all cotton cloths in many constructions, either carded or combed; woolen and worsted mills produced products entirely of wool or worsted where the major variable in raw material was the grade and length of the particular raw fiber used. Of course, small quantities of Mohair were used and from time to time, silk was run as a fashion item for a spring season in modest volume. During those days, stylers principle concerns were pattern and color. They worked primarily with well established base cloths which were run season after season with only color and pattern changes. True, they also were involved in sales, but in other respects their functions were relatively uncomplicated. Today a synthetics styler in our organization must concern himself, in addition, to four polyesters—Dacron, Kodel, Fortrel, Vycron; three acrylics — Acrilan, Creslan, Orlon; Nylon; Modacrylics; Acetate; Arnel Triacetate; Regular Rayon; Avron and Narcon high tenacity Rayon; as well as Zantrel and Avril polynosic rayons—all of which are available in several lusters as well as a variety of staple lengths and deniers. He must be intimately familiar with blends of various fibers; the effect of twist, denier, staple length, reeding, construction and weave on all the various fiber combinations; dyeing techniques necessary to properly color the various combinations, and proper finishing procedures required to create the effects desired for the end use intended. In short, our modern day stylist is also a fabric engineer conversant with the peculiarities and reactions of a multitude of new man-made fibers all of which react differently and can be manipulated by proper handling.

Due to the complications created by the advent of new fibers, a basic change has evolved in the styling — mill relationship as compared to typical woolen and worsted organizations. The latter, operating as they have, in well exploited, fairly familiar, comparatively stable fabrics and constructions used to best advantage a styler-designer team wherein the styler in the market place furnished pattern ideas and blankets and fabric ideas by description or sample—for example, make a 12 ounce 4 harness flannel; or, make a 13 ounce 2 ply pick and pick sharkskin suitable for clothing; or, duplicate the enclosed imported irridescent twill. The designer, based at the mill, laid out the blanket items in proper mill terms and constructions and was charged with the technical responsibility for creating the requested fabrications. In short, he was the technician and fabricator while the stylist was an idea man—salesman, often not well grounded or knowledgeable about fabrics, but with a flair for pattern. The modern day synthetic fabric styler, because of all the perviously cited reasons, has usurped most of the designer's functions, so that even though we do function in concert with mill designers, their responsibilities have been radically reduced to picking out weaves, making up reed plans, chains, and draws, etc—in short, a mill service function rater than a creative function of design and fabric development. Please bear in mind that I am referring to a typical men's wear synthetic oriented woven operation. The old styler-

designer relationship still exists in the primarily woolen or worsted blend organizations.

As previously mentioned, styling is closely aligned with sales and merchandising. Stylists in our organization work closely with customers and salesmen. Some are assigned primary responsibility for accounts in their particular field — a suit stylist might call on key clothing accounts, while a stylist whose primary concern is the boys wear trade would be assigned typical customers in his field. Stylists are encouraged to go out in the market with salesmen making their rounds; conversely, salesmen routinely have stylists on hand when showing lines to customers. In addition, stylists are urged to visit retailers. Through close association with customers and retailers, the stylist is better able to maintain a watch on market trends and needs so that these needs may be anticipated and satisfied. But, so much for the broad, general relationship of the stylist to other members of the organization. What about his **specific** duties and responsibilities as the creative member of the merchandising team? How does he function in that group? What part does he play? Where do ideas originate and how are they implemented? What actually happens in the New York office of a typical men's wear sales organization? Where does it all begin?

To start with, one basic fact must be understood! Just as in the domestic business where white sheets and pillow cases represent the lions share of the volume—in several constructions of course—while fancy prints and colored goods sales are small by comparison, so in the men's wear field staples or basic plain fabrics such as twills, flannels, sheens, tropicals, bengalines, coverts, cords, linen effects, poplins, etc. represent probably 85% or more of the volume for dress slacks and outerwear, somewhat less for clothing.

It has often been said that there is really not much new under the Sun—the implication being rather obvious. So it is in our business now, and so it will be in the future. Perhaps, from time to time, a new basic item will be conceived that will assume its place with existing staple fabrics—my guess, however, is that far greater strides will result from improvements and refinements made on existing staples from yarn development and fiber development. For example, Lycra, the new DuPont fiber, when introduced in a variety of basic fabrics, will impart stretch characteristics to a variety of basic fabrics.

In case some of you are wondering what an 85-15 ratio of staples to fancies has to do with specific styling functions, it indicates the most important, most vital area of styling concern today—fabrication. For herein lies the crux of successful volume merchandising concentration and the area where the stylist can best distinguish himself. Through a knowledge of the characteristics of the various fibers, how they blend, dye and react in cloth, he is able to engineer new and improved basic fabrics with unique appearance and hand, increased abrasion, better wash and wear performance, improved stability, longer more satisfactory wear.

New ideas for fabrics may originate from anywhere within the organization. They come from the sales area as a result of customers suggestions, items seen in competitors lines, or because of alertness on the part of competent salesmen who recognize a need for a particular cloth. They originate in the styling area from fiber and fabric development experiments, from blanket work in previous seasons, or from purchased fabric import sample cards. Ideas also come from merchandising management as a result of analyzing current sales trends and projecting into the future or from new fiber development information received as a result of fiber company contacts.

In any case, once an idea for a fabric is presented, it is the stylist who must develop and create a saleable fabric. Most mill organizations have sample department facilities available where small poundages of new yarns can be spun, experimental pieces and blankets woven, cloth dyed and finished. It is here that the mill designer is head-quartered, to receive layout and construction details from the styler and supervising the manufacture of the samples. Lab dye instructions are furnished the dye plant and eventually color standards set-up from the lab dyeings. Frequently the stylist will visit the dye plant when experimental or developmental work is in process to furnish guidance and direction regarding color and hand desired. Once work has been approved and new constructions put through the lab for complete end use testing, often including actual wear testing, at a suitable time before a line is to be opened—usually eight to ten months—fabrics are evaluated by key merchandising people. A review is made of ranges to be re-run, base fabrics to be re-run, and in general terms, new fabrics deemed worthy of inclusion in the new line, selected. A sales projection is developed fabric by fabric, range by range. The stylist reviews sales by color for repeat ranges and issues dyeing instructions for color lines in accordance with trends, past history, instinct, and lab dye developments. He also issues finishing instructions for all fabrics and is responsible for the approval of all color and hand submits until such time as cloths are turned over to the production people.

Notes from the Dean

The program presented at Clemson recently (arranged by John Wigington of A.T.M.I.) for the National Council for Textile Education was well received by both educators and industrialists. The conferees were impressed and often surprised to learn how rapidly certain educational developments are taking place in South Carolina. Developments which are not only serving to attract additional industries but more importantly serving those now well established—**Textiles.** Of course to serve the industry is to serve the people and to serve the people is to serve the industry.

Three of these developments, (1) Technical Education, (2) Educational Television, (3) Management Graduate Program, referred to above and briefly discussed here have taken place for many reasons, but certainly one underlying reason, common to all, is the impact of automation. Regardless of which one of the 24 definitions of automation listed by James R. Bright, in his book "Automation and Management" — you prefer — it is usually agreed that automation involves change — the kind of change that requires the loom fixer to know more, the executive to study harder, yes, and even the college professor to take refresher courses, or perhaps even select a new field of endeavor. In short, no profession or trade has a monopoly on obsolescence.

TECHNICAL EDUCATION—The Greenville Technical Education Center, one of several in the state, picks up where the public school leaves off. T.E.C. already offers courses of study in such careers as chemical technology, drafting and design, machine shop, mechanical technology, and data processing—these graduates (highly skilled workers who have learned a specialty, or technicians ready for on the job training) are constantly being sought after and employed by the textile industry. Now, however, the Center plans to produce a reservoir of technical talent for textiles per se. The proposed textile technology program should get underway by January 1965, which is none too soon when one observes the rapid technological advances reflected in the new plants and at the same time observes the advanced average age and degree of skill of those now employed in the mills.

EDUCATIONAL TELEVISION—In South Carolina Educational Television is now a wide spread and vigorous part of education. It is constantly expanding its services to the elementary, high schools, and colleges, as well as industry itself. The nursing series produced in cooperation with the South Carolina Hospital Association for nursing training and the insurance courses presented in 39 centers througout the state, jointly sponsored by the South Carolina State Insurance Department and the Executive Committee of the South Carolina Association of Insurance Agents are two excellent examples of how industry can benefit from this medium. **Textile executives** will want to keep posted on more recent plans to bring to the plant up-to-date programs in supervisory training under the auspices of the Greenville T.E.C.

MANAGEMENT GRADUATE PROGRAM — Again to meet changing demands for managerial talent, the Master of Science program in Industrial Management at Clemson University is now firmly established. Conceived in 1961, started in 1962, the program is attracting applicants who have diverse undergraduate training. Currently participating in the program are students representing ten disciplines including—forestry, math, ceramic engineering, and mechanical engineering—from six different colleges.

Each candidate must take the core curriculum made up of the following:

QUANTITATIVE ECONOMIC ANALYSIS—An apliication of quantitative techniques including an introduction of econometric models as a potential method of solving many of the problems arising in a modern industrial enterprise.

FINANCE—The analysis of the financial condition of business firms as a means of recognizing current and long-term financial needs. Emphasis on selection of the most feasible actions necessary to secure the best possible financing under varied circumstances.

PRODUCTION MANAGEMENT — An analysis of the problems facing an industrial enterprise in planning, organizing, directing, and controlling its production activities and a study of the literature of the scientific management movement.

MANAGERIAL POLICY—A course in management policy making. The course emphasizes determining objectives and developing sound policies for achieving them. Managerial Policy builds upon and integrates the other graduate courses. The case method is used extensively.

The objective of this program is to aid college graduates in preparing for positions of major responsibility in American industry. Graduates of engineering or science curricula are especially encouraged to enter, although it is considered equally as valuable for individuals with other backgrounds.

—Wallace D. Trevillian

In a recent Industrial Management Seminar, Dr. Brown Mahon, Chairman of the South Carolina Board of Education and Carolina Federal Savings and Loan Association of Greenville, S. C., spoke on "Community Responsibility". Shown above are (left to right) Dean Wallace Trevillian, Bruce M. White, William W. Sattia, Jr. and Dr. Mahon. Mr. White and Mr Sattia are I.M. graduate students.

This seminar was one of six that is held during each academic year wherein outstanding men in business and industry are invited in to talk to and with Industrial Management factulty and students.

Outstanding Seniors . . .

Thomas Warren Weeks

Thomas Warren Weeks is a twenty-one year old married student majoring in Industrial Management. He is a native of Aiken, South Carolina.

Tom transferred to Clemson from Furman University at the beginning of his sophomore year. While at Furman, he played freshman football and was on the Dean's list for two semesters. At Clemson, he has held a high scholastic average for four semesters. He is an active member of the Central Savannah River Area Club and the Industrial Management Society.

During the summers, Tom has gained valuable experience in his major field by working with Owens-Corning Fiberglas in Aiken in the Technical Control Department and with Daniel Construction Company in the Receiving Department.

At present, Tom is still undecided about his plans after graduation.

William Allen Suttle

William Allen Suttle, a twenty-two year old Textile Science major is a native of Great Falls, South Carolina. He has received ceived a Sonoco Products Scholarship to aid him with his expenses at Clemson .

William is an active member of the Numeral Society, the Chester County Clemson Club and Phi Psi. He is enrolled in ROTC and serves as the Battalion S-4 for the Third Battalion.

For the past four summers, William has worked for J. P. Stevens in Great Falls, South Carolina. He worked three summers in the Industrial Engineering Department and one summer in the Slashing Department.

After graduation, William plans to go to graduate school but he is still undecided upon the institution.

Walter T. Cox, Jr.

Walter T. Cox, Jr., a twenty-one year old Industrial Management major is a native of Clemson, S. C. He is married to the former Miss Vicki Grubbs of Anderson, S. C.

During his four years at Clemson, Walter has made an outstanding record. He is a member of Blue Key; Scabbard & Blade; Block C; Delta Kappa Alpha; Tiger Brotherhood; and serves as Placing Chairman for the Central Dance Association.

Walter played football for four years and has received a grant-in-aid from the Clemson Athletic Department. He is currently Brigade Commander in Army ROTC and holds the rank of Cadet Colonel. He has received the Reserve Officers Association Award, and is listed in Who's Who.

During the summer, he has worked for Clemson Excelsior Mill, Sears in Anderson and Clemson Physical Plant. After graduation, he plans to go into the Army.

James Michael Logan

James Michael Logan, a married student majoring in Textile Management, is a native of Mooresboro, N. C. He has received a Sonoco Products Scholarship to aid him with his expenses at Clemson.

Mike transferred to Clemson from Gardner-Webb Junior College in Boiling Springs, North Carolina. While at Gardner-Webb, he was president of the student body. For two and a half years Mike worked full time with Shelby Mills, Inc., in Shelby, North Carolina, in the production control department. He also worked one summer in the same department after entering Clemson.

After graduation, Mike would like to enter production control or costing.

Guy Edward Ballard

Guy Edward Ballard is a twenty-one year old Textile Management major from Columbia, South Carolina. To aid with his college expenses he has received a Carolina Yarn Association Scholarship.

Ed has been an active member of the Central Savannah River Area Club, and Phi Psi, the national textile honorary fraternity. He has worked for two summers with Sears in Augusta, Georgia, and one summer with Sibley Mill also in Augusta. During the past summer he worked for Gaffney Manufacturing Company in Gaffney, South Carolina.

Immediately upon graduation Ed plans to accept a position with Gaffney Manufacturing Company.

THE TEXTILE COMEBACK

By Clarance Newman

The din of carpenters' hammers echoes through a section of the Burlington Industries, Inc. plant and manufacturing manager Joseph E. Sampson has to shout to make himself heard. "We never stop changing," he says. "We go on the theory that everything we do is wrong and we have to look for better methods.

Mr. Sampson was speaking for Burlington, the nation's largest textile company. But his words reflect the vigorous new attitude of the entire industry.

For years it seemed that just about every thing the textile industry did was, indeed, wrong as sales and profits dropped because of ancient equipment, often weak management, foreign competition and other problems. Some problems still remain. But, largely because of a trend toward mergers and increased capital spending, the industry has been making considerable progress in solving them.

"A new and better day is dawning for the American textile industry," says Robert T. Stevens, former Army Secretary and now president of both the American Textile Manufacturers Institute and J. P. Stevens and Co.

Total profits of all textile manufactures hit $346 million in 1962, up from $248 million in 1957, according to Government statistics. Profits during the third quarter of 1963, the latest period for which such figures are available, totaled $97 million, up 13% from the like period a year earlier. Industry sales totaled $3.8 billion in the third quarter of 1963, a 6% increase over comparable 1962 period.

The brighter picture is reflected in the fact that the industry now is operating at 90% of capacity compared with 80% in 1957. Moreover, capacity itself has been increasing during this period, due to more efficient equipment.

This resurgence follows a drastic shake-up in the industry. Between 1947 and 1960, a Senate Committee subcommittee had reported 838 textile companies closed down. In the thre years through 1961, 110 others were acquired by bigger companies. "The big are getting bigger" says one textile man. "I look for more mergers, more liquidations, simply because the smaller mills can't keep pace."

"Ten years ago the 10 largest publicly reported companies had sales of $1.9 billion, or 15% of textile mill sales," says John B. Cave, treasurer of Burlington. "In 1962 the 10 largest publicly reported companies had 23% of industry sales. This concentration has led to more diversification, larger expenditures for research and new equipment and increased financial stability."

William J. Erwin, president of Dan River Mills, Inc. figures that industry spending on capital improvement totaled $650 million last year, up from $610 million in 1962 and $500 million in 1961. Dan River itself spent more than $10 million last year to build and equip a new quarter-mile long, air-conditioned plant in Greenville, S. C. During the last five years, Burlington has invested $205 million in new capital equipment and facilities, exclusive of spending on acquisition of other companies. This year the company expects such outlays to rise 10% above 1963's $52 million.

Due mainly to increased capital spending by mill owners, textile industry productivity per man hour climbed 55% during the 1952-1962 period, according to Federal Reserve Board figures. Even so textile industry sources note that about 80% of existing textile plants and machines are at least 10 years old. They look for a continuing increase in capital spending by textile manufacturers to take advantage of cost-cutting machinery.

Machinery makers have developed high speed frames for spinning fiber into yarn which they say can boost productivity 50%. Improved looms, for weaving the fiber into cloth, are faster and also wider, so operators can turn out bigger strips of fabric in less time. Automatic vacuum cleaners coast along overhead tracks in the mills, pulling up lint through long hoses dangling almost to the floor, thus reducing time lost through stoppage of clogged equipment.

Computers also are finding increasing application in the textile industry. Burlington recently started using them to supervise the mixing of different colored dyes, to reduce the possibility of human error. An IBM 1410 computer and a Univac 1004 punchcard processor help coordinate J. P. Steven's two dozen merchandizing departments in New York with its 29 manufacturing units scattered around the country. Soon Stevens plans to turn many tasks linked to purchasing, inventory control and order assignments over to computers.

Along with bringing in electronic brains some companies have been stepping up efforts to recruit and train talented executives. "Time was when management in the textile busines was largely a family affair," says Mr. Erwin of Dan River. "Some of the giants of this industry were and still are family enterprises; make no mistake about that." But others more numerous have passed from the scene. More and more the industry is being directed by professional managers.

Dan River yearly lures about 40 college graduates and rotates them among various departments for training as executives. Each year Burlington hires 125 to 150 college men for its marketing and manufacturing executive training programs.

The textile industry has benefited from the proliferation in recent years of such man-made fibers as triacetate, polyester, and acrylic to supplement those synthetic stand-bys, nylon and rayon. All these synthetics have reduced the industry's dependence on natural fibers whose prices often fluctuate widely.

"We freely switch from one synthetic fiber to another" says Charles F. Myers, president of Burlington. "We simply use what the public wants."

From both synthetic and natural fibers, industry researchers have been developing new types of fabrics. These feature such special quality as resistance to wrinkles, mildew, germs or even fire.

Stretch fabrics, introduced in 1959, represent one of the most important new developments. "Our business is booming right now because demand for stretch has grown tremendously," says Martin Cohn, president of International Stretch Fabrics, Inc. "I'd predict that in five years everything people wear and use will be made with stretch with the possible exception of handkerchiefs."

Makers of tufted fabrics, some times referred to as fake furs, also are enjoying booming sales. "Business couldn't be better," says Clarence E. Halford, president of Glenoit Mills, a division of Botany Industries, Inc., and a major producer of tufted fabrics.

While adding new fabrics to their lines, some makers have been dropping older, less promising products. "We've made material changes in one product in an effort to eliminate unprofitable items," says Ceasar Cone, president of Cone Mills Corp. "Even though it may produce a $2 million to $3 million sales decline., we're getting out of lines we see no future in. But this should result in improved earnings."

Of the problems that still plague the textile industry, perhaps the most pressing is the Federal two-price cotton program. Under this program, domestic mills must purchase cotton at the Government-supported price which currently runs about 8½ cents above the world market price, at the same time, the Government pays U. S. cotton exporters the difference between the domestic support price and the world market price; so the exporters can afford to sell their cotton at the world market price. Thus, textile men point out, foreign textile mills can buy American cotton cheaper than U. S. mills can. This gives overseas competitors the advantage of lower raw material cost to add to their generally lower labor cost.

Textile men say that in some cases imported fabrics have sold in this country as much as 40 cents a yard below what it would cost to produce them in the U. S. Burke M. McConnell, Burlington vice-president, recently told the U. S. Tariff Commission that the industry was "haunted by the ever rising line on charts representing the flow of foreign-made textile products into the market."

Some textile manufacturers are worried that an intensified organizing drive by the Textile Workers Union, AFL-CIO, will push their labor costs higher and make them even more vulnerable to foreign competition. Of the industry's 800,000 production workers, only some 255,000 are union members. In the South, which has been drawing more and more textile plants since the 1920's, only about 10% of the workers are organized. The TWU now pushing a drive to sign up members in J. P. Stevens' mills, says that the average pay in the textile industry lags 30% behind that for all manufacturing employees and contends that non-union workers in the industry earn considerably less than union men. The American Textile Manufacturers Institute reports that average weekly earnings in the industry amounted to $72.34 last December.

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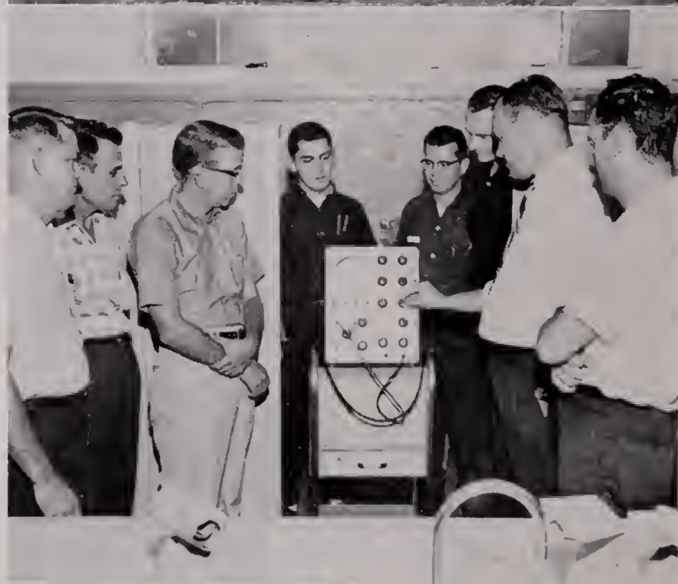
PROFESSIONAL DEVELOPMENT COURSES



The Bobbin and Beaker would like to call attention to its industrial readers the Courses for Professional Development that will be offered in the School of Industrial Management and Textile Science during the Summer.

This will be the seventh annual schedule of classes and since the program's start, more than 400 persons in various branches of industry have completed courses.

The courses and dates of each are as follows:

Introduction to Textile Manufacturing
Dyeing and Finishing .... July 6-10

Yarn Manufacturing .... June 15-26

Will be repeated .... July 6-17

Supervisor Development .... June 15-26

Will be repeated .... July 6-17

Methods Analysis and Time Stuly ... June 15-26

Quality Control .... June 15-26

Basic Textile Chemistry .... July 20-31

Advanced Textile Chemistry ...... August 3-14

The classes will be conducted from 8:30 A.M. until 4:30 P.M. Monday through Thursday with a half-day session on Friday. All classes will have several instructors and most will be held in air-conditioned buildings.

A catalog with complete details, including application forms, may be obtained by writing to Professor C. V. Wray, Sirrine Hall, Clemson College, Clemson, S. C.

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THE BOBBIN AND BEAKER
Student Publication
School of Industrial Management and Textile Science
Clemson College
CLEMSON, SOUTH CAROLINA

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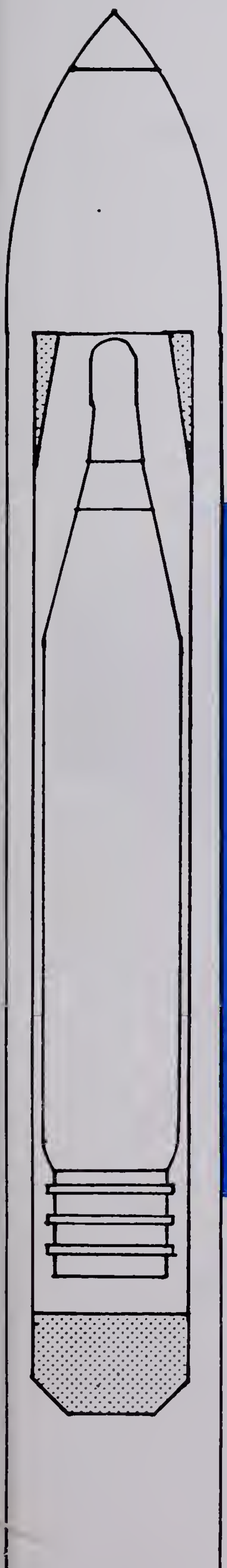

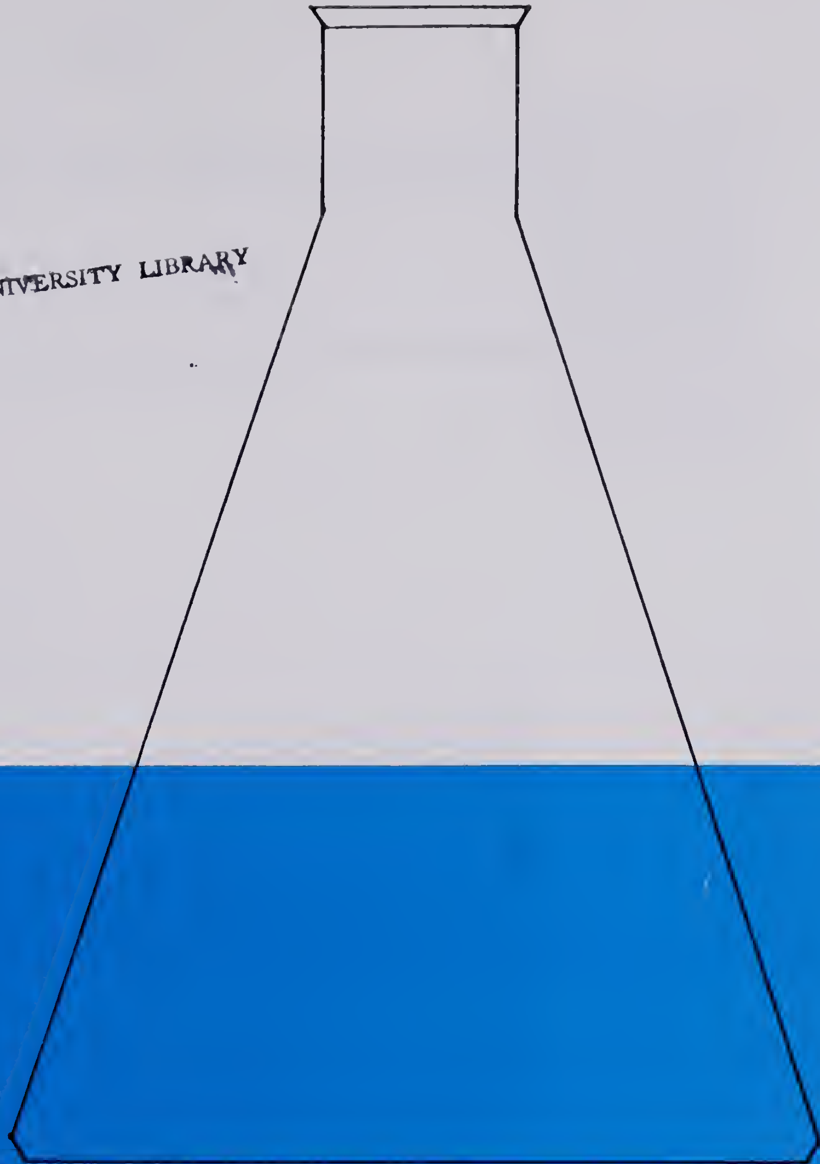

Bobbin & Beaker

THE

Bobbin & Beaker

Official Student Publication
Clemson School of Industrial Management and Textile Science

VOL. 21 SUMMER ISSUE 1964 NO. 4

The Staff

* * * *

Faculty Advisers

In This Issue

The BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson College School of Industrial Management and Textile Science.

Address: The Bobbin and Beaker, School of Industrial Management and Textile Science, Clemson College, Clemson, South Carolina.

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.

from the Editor

With this issue, a new staff takes over the Bobbin and Beaker. It is our aim to publish a magazine that will be enjoyable to all of our readers. The Bobbin and Beaker is primarily a student publication, but this does not limit our articles to those written by students only. As students we can qualify to write on general terms so we must look toward the industry to furnish material that will be interesting for our readers. We are open for suggestions at all times so let us know the type of material you want to read. We want our magazine to be second to none.

Henry M. Poston, a textile management major, from Johnsonville, South Carolina, heads up the new staff. The new Advertising Manager will be Wesley Connelly, a textile management major from Spartanburg, South Carolina. Marshall White, a textile major from Rock Hill, South Carolina will serve as Circulation Manager. The Managing Editor will be Bruce Edwards, a textile chemistry major from Tryon, North Carolina.

To date the circulation list entails some 2700 readers. We feel proud of the fact that there exists so much interest in our student magazine and we hope that this number will continue to increase.

— Henry M. Poston

Seated: Henry M. Poston, Editor; Wesley Connelly, Advertising Manager. Standing: Bruce Edwards, Managing Editor; Marshall White, Circulation Manager.

Mathematics and Management

By Dr. C. H. Whitehurst, Jr.

Dr. Whitehurst received his B.S. (Int'l Affairs) Florida State University in 1957; his M.A. Degree (Economics) from Florida State University in 1958 and his Ph.D. (Economics) from the University of Virginia in 1962.

He served in the Merchant Marine, World II; U. S. Army, Korean War; and is in the U. S. Naval Reserve (presently LT ready reserve).

Dr. Whitehurst is a member of the following organizations: Southern Ec. Assoc.; American Ec. Assoc.; Econometric Society; Institute of Electrical and Electronic Engineers; American Assoc. for Adv. of Science; S. C. Academy of Science; and U. S. Naval Institute.

LUCY: How are you doing in school these days, Charlie Brown?

CHARLIE BROWN: Oh, fairly well, I guess . . . I'm having most of my trouble in arithmetic.

LUCY: I should think you'd like arithmetic. It's a very precise subject.

CHARLIE BROWN: That's just the trouble. I'm at my best in something where the answers are mostly a matter of opinion.[1]

The attitudes evidenced by the following discussion between the chief characters in the comic strip "Peanuts", is undoubtedly shared by a vast majority of today's college freshman classes.

The roots of this distaste for mathematics reach deep. And without question the public elementary and secondary school systems of the nation must accept a large measure of responsibility. The freshly scrubbed, new first grader does not leave home with a foreboding of arithmetic;—something to be avoided at any cost. In all too many cases it is a **conditioned response.** Yet this is precisely the attitude with which university faculties must contend twelve years later.

To many of those whose responsibility it is to cope with this fear-induced rationale (on the part of college students) Admiral Rickover's criticism of mathematics teaching in the public schools has not been unduly harsh.

[1]**Peanuts**, copyright 1959, by United Feature Syndicate

Clemson's Industrial Management Curriculum

In September of 1964 entering freshmen who have elected Industrial Management as their college major will note, perhaps with some trepidation, that their first year of college work is identical to that of the engineering student. Of particular significance and interest is the fact that the **first course** in mathematics for which credit will be given is Math 106 (Analytic Geometry and Calculus I)[2].

Further along in the curriculum the new student will find statistics and such math-oriented courses ("precise subjects" as LUCY would say) as econometrics, quality control, production, planning & control, and managerial economics. And at this point he might reasonably feel entitled to some explanation . . . for the prominence given mathematics and quantitative management and economic courses.

That is what this article is . . . an explanation. Chiefly to the student, but also his family and future employer.

Past

Without belaboring the point of what business education in American colleges and universities was in the recent past; suffice to say it was found lacking[3] . . . this essay will deal, at least in part, with what it is . . . at Clemson, how it got that way, and where it is going.

In 1955 Dr. Wallace D. Trevillian, now Dean of the School of Industrial Management and Textile Science, was given the assignment of devising a curriculum that would adequately prepare South Carolina's young men for positions of managerial responsibility in their own state, the Southeast and Nation. His approach was to cut superficiality to the bone, and instead, through judicious choosing, to blend many of the already existing excellent courses in mathematics, English, engineering, accounting and economics into a new curriculum . . . Industrial Management.

Never seen were such abominations as Business Mathematics and Business English. Even a cursory examination of the 1956 **Clemson College Record** shows that there was to be no compromise with mediocrity.

Present

Where we have been is a matter of record. How a department decides which courses shall constitute its curriculum is yet another matter. Perhaps this can best be understood if the reader will put himself into "faculty shoes" for a moment. Preferably those of the Department Chairman. Before him are 144 semester hours of academic studies, representing four college years and a large monetary outlay by the student, his parents and the State of South Carolina. Yet in the final analysis he and his faculty must decide upon the courses which will make up the department's curriculum.

A partial list of considerations would include:

1. Accreditation—the curriculum must be judged and pass judgement by its peers.

2. Professional preparation—the curriculum must prepare a student to succeed in his chosen field. Employers will not long return to hire the poorly trained.

3. The curriculum must be **respected** on its own campus . . .by faculty and students alike.[4]

4. The curriculum must be competitive in content with other colleges and universities. It is a disgrace of the first magnitude for a good and conscientious student to strive and excell (in a poor curriculum) only to find that the "outside" world would consider his achievement for naught.

5. The curriculum must be of sufficient depth and excellence to give the superior undergraduate student a reasonable chance of being accepted by the nation's **best** graduate schools. This is a minimal requirement.[5]

The above list is not exhaustive. Much more could be said.

It might also be noted, however, that each of the above considerations must be maximized within a budget constraint.

Returning to mathematics and industrial management.

If mathematics (and math-oriented courses) had begun to trickle into business and management curriculums in the 1950's, the first three years of the 'sixties figuratively saw the flood gates open. By 1961 the great majority of the nation's business curriculums were striving to reach Clemson's 1955 departure point. And it was in 1961 that the Industrial Management Department reviewed its mathematics requirements and found them wanting. The following year Math 200 (introduction to Calculus) was made mandatory for all department majors.

In 1960 the industrial management student had been introduced to formal logic in his introductory course in management. Fully one third of this course is now devoted to the subject. Syllogisms, deductive and inductive arguments and reasoning and the meta language of the logician are accepted as routine.

Given a calculus base, courses in such areas as econometrics and operations research could now be planned and faculty sought to teach them.[6]

Introduction to Econometrics become a required course in the I.M. curriculum in September of 1964.

Last year when the Engineering School revised its Freshman mathematics requirements, the Department of Industrial Management did likewise. It was not in any sense a case of "follow the leader." The department really had no choice. In 1962 and '63 the "quantitative stem" of management training had further broadened. Courses and curriculums at schools with which Clemson's IM Department wished to be identified had greatly expanded their offerings in these areas. For most if not all calculus was a prerequisite.

At this point the prospective student (and his parents) might reasonably ask that a case be made for such a heavy dose of mathematics (and logic) on their own merits . . . not necessarily what other institutions are and are not doing. It is a fair question and I believe the industrial management faculty would answer it in this fashion.

First. Training in mathematics brings preciseness and clarity to thought and communication. While it is not argued or even desirable that the mind must work like a computer, equally to be avoided is "fuzzy" thinking and speech.

Second. Mathematics can make the **abstract** manageable. Brilliantly conceived ideas must be reduced to manageable portions before they can be examined and applied. This is no less true in the case of the industrial manager.

Third. Mathematics can (and should) be in the least a limited **common language** between the industrial manager and the physical scientist and engineer. The mix (or non-isolation) of manager, engineer and scientist is complete in a growing number of corporations and government departments.

A Final Word: The Future

In this short essay a case for increased mathematics in the industrial management curriculum has been made. Unfortunately, perhaps, for those like CHARLIE BROWN who are at their best in matters of opinion, the arguments and rhetoric of this article will not decide the issue. In essence the decision was foreordained as our industrial society increases its complexity at an exponential rate.

But also . . . and mark this well. While mathematics as an important direct and indirect tool of the industrial manager is here to stay, **it is not the only tool.** By definition, industrial management is a broadly based curriculum. For the **real value** for the industrial manager lies in the many facets of his education. Economics, engineering, communications, accounting and industrial management courses themselves are equally important. And the IM student can with absolute certainty expect these to be made more rigorous, upgraded and expanded as the demands of our industrial society change.

Perhaps the only thing certain about the IM curriculum is that it will not remain fixed. "SUBJECT TO CHANGE" might well be stamped across its 144 hours. In a decade which will see space flight to the moon and beyond . . . any other labeling would be a farce.

[2]This is in accordance with tentative recommendations by the Mathematical Association of America for undergraduate programs of students in the biological, management and social sciences.

[3]For specific evaluation and criticism see R. A. Gordan and J. E. Howell, **Higher Education for Business** (New York: Columbia University Press, 1959); F. C. Pierson, et al., **The Education of American Businessmen** (New York: McGraw-Hill Co., 1959).

[4]On the basis of 1963 Graduate Record Examination scores the Department of Industrial Management averaged slightly higher than the University as a whole.

[5]This can best be seen noting the increasing number of top-grade graduate programs that require two semesters of calculus as an entrance prerequisite, e.g. Purdue and Cal. Tech.

[6]Many a department of business administration has initially attracted mathematically competent faculty only to have them leave upon discovering that the students did not have the background necessary for their courses.

Left to right: John Willis, secretary; Emory Poole, treasurer; Wesley Connelly, president; Gary O'Shields, vice-president.

A. A. T. T. Activities

By
John Willis, T.S. '66

The student chapter of the American Association for Textile Technology at Clemson was organized to provide textile students with an early means of becoming associated with the organization of A.A.T.T. and to advance at the local level the aims and goals of the parent national association.

A.A.T.T. meets once a month and has varied programs such as guest speakers, films, and demonstrations. A.A.T.T. has had two outstanding lectures this year. On October 8 Mr. Herman Jones, Research Engineer for Saco-Lowell Shops, spoke on "The Spinning Mill of the Future." On December 3, Mr. Thomas D. Efland, Associate Dean of the School of Industrial Management and Textile Science of Clemson University, spoke on "The Hanover Textile Machinery Show and European Tour."

A.A.T.T. had two very beneficial field trips this year. The first trip, taken during the fall semester, included tours of the Gayley Mill at Marietta, S. C. and Judson Mill in Greenville, S. C. Both are Divisions of Deering Milliken, Inc. The second trip, taken during the second semester, included tours of the Beattie Plant of Woodside Mills at Fountain Inn, S. C. and the Magnolia Finishing Plant, a Division of Pacolet Industries at Blacksburg, S. C. These field trips are most informative because they offer us practical examples of the principles and techniques that we are taught in class. They also offer us an opportunity to observe working conditions and ask questions about the policies and fringe benefits offered by our future employers.

At the A.A.T.T. meeting on Tuesday, April 14, there was an election of new officers. The officers are Wes Connelly, Chairman; Gary O'Shields, Vice-Chairman; John Willis, Secretary; Emory Poole, Treasurer; Fred Hardee, Program Chairman; Wayne Reynolds, Publicity Chairman; and Gregory Catoe, Corresponding Secretary.

The A.A.T.T. activities for this year was concluded with a banquet at the Food Industries Auditorium on April 29th. Professor W. T. Zink of the Electrical Engineering Department was guest speaker.

As A.A.T.T. brings to a close another year of activities we can only say that we hope to come back this fall with renewed interest so that we can strive for a bigger and better program for our student chapter of A.A.T.T.

THE NEED FOR EXPANDED TEXTILE RESEARCH

By: Thomas D. Efland
Associate Dean of the School of Industrial Management and Textile Science

In contrasting the filmy, gossamer, sheerness of a negligee for boudoir use with the bulky ruggedness of a space suit for astronaut use, an astute observer notes two things they have in common. The first of these is that both are end products of long and costly research programs, and second, they were both developed to help achieve a mission. The negligee's design intent is to stimulate emotions and expose the contents, while the space suit is to simulate an environment and protect the contents from exposure. Research on the first of these garments predates Cleopatra, while the necessity for the latter originated only a decade ago. The contrast between two such garments as these tends to show the extreme diversification of textile research.

Currently, research into materials for space is tending more and more into the fiber area. Solving the apparel problems of the astronaut is only one aspect of the program. As man ventures into space, he will not only need the hardware to get him up there, but he will also need structures to create an inhabitable environment. Since these structures will have to be transported in very small spaces, textile-type materials seem to be the answer. Very active programs are seeking fibrous materials that can withstand extreme temperatures. Configurations for fabric structures that can be expanded and made rigid after they are inserted into space seem to be the answer to space housing problems.

In the more prosaic area of wearing apparel, the emphasis is on stretch-type fabrics. Natural fibers are being chemically modified to give them the elasticity necessary to produce stretch garments. These fibers are augumented by the use of nylon and other man-made fibers in stretch fabrics. These fabrics which give comfort and fit to a garment are the culmination of extensive research programs extending back several years. They are but one item developed by a broad front of research for newer fabrics, better fabrics for old purposes and more economical means for producing them.

In emphasizing the need for a strong textile industry and the continued need for research, Senator Pastore, addressing the Eightieth Convocation at Philadelphia College of Textiles and Science, said, "Textile materials are second only to steel in importance to national defense." Clothing, like food, is essential for the soldiers in the field, but beyond that, textile materials are important elements in much of his equipment and in his weapons.

To maintain an industry strong enough to supply military needs, as well as a broad consumer market, increasing research effort will be necessary. To assure the manpower for such an effort, graduate programs will have to be expended and more students with interest in textiles encouraged to enroll for advanced study.

Outstandin

WILLIAM T. DAVIDSON

William Davidson, is a twenty-two year old Textile Management major from Avondale, North Carolina. Bill was the recipient of the Keever Starch Scholarship awarded to an outstanding junior or senior majoring in textiles. Bill is very active in campus life. He has been a member of the Taps Staff for three years; a member of Phi Psi, national honorary fraternity for textile students; Blue Key, national honorary fraternity; and Sigma Alpha Zeta, social fraternity.

After graduation, Bill plans to enter the Air Force for pilot training for five years.

SPENCER BERNARD BATES

Spencer Bernard Bates is a twenty-six year old Textile Chemistry major from Deerfield Beach, Florida. He is married and the proud father of two boys.

Spencer transferred to Clemson from Palm Beach Junior College in 1961. While at Clemson, he has been an active member of Phi Psi Honor Fraternity and the American Association of

Textile Chemists and Colorists. He received a Geigy Scholarship in his senior year to help defray some of his expenses.

During the summers, Spencer has worked for the Beacon Manufacturing Co. in the engineering office and for the Sjostrom Machine Co. as a sales engineer. After graduation, he will accept a position with American Cyanamide in the Creslan plant at Pensacola, Florida as a Development Engineer.

WILLIAM TOM PACK

William Tom Pack is a twenty-two year old Textile Science major from Inman, South Carolina.

While at Clemson, Tom has made a good record both in his studies as well as in other activities. He is a member of Phi Psi Honor Fraternity and is an outfielder on the baseball team.

To help with finances while at Clemson, Tom received the four year Inman Riverdale Foundation Scholarship. During the past four summers, he has gained valuable experience with the Inman Mills.

After graduation Tom plans to enter military service before accepting a position in industry.

Seniors . . .

ALEXANDER B. CREDLE, JR.

Alexander Credle is a twenty-two year old Industrial Management major from Poughkeepsie, New York.

Alex has been a member of the Student Senate his junior and senior years; a member of the Y.M.C.A., Presbyterian Student Association; Society for the Advancement of Management; Council of Club Presidents; Nu Epsilon social Fraternity; Blue Key and "Who's Who" in American Colleges and Universities. Alex served as president of the Y.M.C.A. his senior year, president of the PSA his junior year, and president of the CCP his senior year.

After graduation Alex plans to accept a position with Humble Oil Company.

NORMAN F. PULLIAM

Norman Pulliam is a twenty-one year old Industrial Management major from August, Georgia. He has been an honor student for five semesters.

This year Norman is president of the Student Senate and Blue Key National Honor Fraternity; parliamentarian of Kappa Delta Chi; a member of Tiger Brotherhood; director of Tigerama; a member of the College traffic committee; listed in "Who's Who among Students" in American Colleges and Universities; and a

delegate to S. C. State Student Legislature. Last year Norman was secretary of the Student Senate; assistant director of Tigerama; and director of Junior Class Follies.

While at Clemson, Norman has received the **Wofford B. Camp Award** to the outstanding Blue Key member and the **Algernon Sydney Sullivan Award** for an outstanding member of the graduating class.

After graduation, Norman hopes to enter Harvard Business School for a Master's degree in September of '64 or '65.

JERRY W. BLACKWOOD

Jerry W. Blackwood is a Textile Management major from Gaffney, South Carolina. He is twenty-two years old and is married. To aid with his college expenses he was awarded a Sonoco Products Scholarship for his last two semesters at Clemson.

For two summers Jerry gained valuable experience in the textile industry when he was employed by Gaffney Manufacturing Company, a mill in the Deering-Milliken chain.

While at Clemson, Jerry has been an active member of several campus organizations, and this year he has served as Editor of the Bobbin and Beaker, and vice-president of PHI PSI. He has also been a member of NT-MS, AATT, Council of Club Presidents, and the Student Senate. A participant of the Army ROTC Flight Program, he will report for three years active duty in November.

After graduation Jerry will work for Limestone Manufacturing Company, a division of M. Lowenstein & Sons, Inc. in Gaffney.

Textile Chemistry Honor Students

George B. Sproles, Marshall White, Mac Harley

The Clemson College School of Industrial Management and Textile Science has recently established a series of Honors Courses to be offered to textile chemistry students of above average academic ability.

The Honors Courses are designed to give interested students an opportunity to undertake academic labors above and beyond those attempted by the average students. Although the honor courses have thus far necessitated greater preparation for classes and have often resulted in low quiz grades for the students in the program, the interest in this unique academic program has continued to increase.

The qualifications for taking Honors Courses are that an entering freshman show an interest in the program and have a predicted 3.0 or better G.P.R. For continuance in the program the student must maintain a 3.0 G.P.R.

In addition to taking Honors Courses in English, Physics, Chemistry, and Mathematics, Textile Chemistry honor students undertake advanced Honors Courses in organic chemistry, chemical processing of textile materials, and synthetic fibers.

Presently enrolled in the program are juniors George M. Sproles, of Silver Springs, Maryland and Marshall White, Jr., of Rock Hill; and freshman Richard Harley of Barnwell, S. C. These students feel that the extra time and effort that they put into the honors program will be beneficial to them in graduate school as well as in their later professional lives.

The Honors Program is coordinated by a college-wide Honors Council, of which Associate Professor Charles V. Wray of the School of Industrial Management and Textile Science is a member.

Phi Psi News Notes

By
Wesley Connelly, T.M. '65

Left to right, seated: Henry Poston, president; Gregory Catoe, vice-president. Standing: Marshall White, treasurer; Wesley Connelly, secretary.

During the year, the Iota Chapter of Phi Psi has initiated twelve new members. These new members were treated to a steak supper on January 6, together with the rest of the chapter.

The new members are Guy E. Ballard, Dennis L. Sauls, Richard A. Hiles, Charles D. Miller, Gregory B. Catoe, Henry M. Poston, Charles E. Fousek, W. Wesley Connelly, Frank B. Eaves, Bruce R. Edwards, Roy T. Ivester, and Albert T. Thompson.

Three recently chosen honorary members were the guests of honor at the annual spring banquet held on May 5. The three honorary members are Mr. M. Earl Heard, Jr., Vice-President in charge of International Sales for Saco-Lowell Shops; Dr. Wallace D. Trevillian, Dean of the School of Industrial Management and Textile Science and Head of the Industrial Management Department; and Mr. Thomas D. Efland, Assoc. Dean of the School of Industrial Management and Textile Science and Head of the Textile Research and Yarn Manufacturing Departments. The initiation ceremony for these three new members was held in the Phi Psi room of Sirrine Hall just prior to the banquet.

The new officers for the 1964-65 school term were elected at the April 6 meeting. Henry Poston is Phi Psi's new president. He is a rising Senior from Johnsonville and is a Textile Management major. The newly-elected vice-president is Gregory Catoe from Kershaw. He is a Textile Management major. Secretary for next year is Wesley Connelly of Spartanburg. He is a rising Senior and majors in Textile Management. Marshall White of Rock Hill is the new treasurer. Marshall is a Textile Chemistry major and is a rising Senior.

The Iota Chapter sent three delegates to the national Phi Psi convention held in Newport, R. I. on May 1 and 2. While at the convention they had the opportunity to meet brothers from other chapters and learn of their activities.

Professor Lindsay Retires

By

Marshall White. Jr., T. C. '65

As we approach the close of another academic year, Clemson University will lose the services of Professor Joseph Lindsay, Jr. Professor Lindsay has announced that he will retire after twenty-nine years of faithful service to Clemson students.

Joseph Lindsay, Jr. was born on October 31, 1898 in Chester, South Carolina. He attended the Chester elementary schools and was graduated from Chester High School. After receiving his A.B. degree from Erskine College in 1919, he attended the Philadelphia Textile School for a year. In 1945 he received his M. S. degree from the University of Tennessee.

For almost ten years Mr. Lindsay was the Head of the General Dyestuff Laboratory in Charlotte, North Carolina. In 1935 he came to Clemson as the Head of the Textile Chemistry and Dyeing Department, the position he has held ever since. While here at Clemson he has done numerous research projects. These include research in bleaching, dyeing of cotton and synthetic fibers, stretch cotton yarn, and in increasing luster and strength of cotton yarn.

Professor Lindsay is a member of the American Association of Textile Chemists and Colorists. He has also acted as advisor for the Clemson student chapter of the American Association of Textile Chemists and Colorists. He is a member of the Y.M.-C.A. Advisory Board; an elder in the Presbyterian Church; and a director of the Fort Hill Savings and Loan Company.

Mr Lindsay was married to Bertha Pressly of Due West, South Carolina in 1928. They have one son, Joseph Lindsay, III, who was graduated from Clemson in 1954. He is now an M.D. in Atlanta, Georgia, specializing in internal medicine. Mr. Lindsay is also very proud of his two grandchildren.

After retirement Professor Lindsay will do consultant and research work in the field of textile chemistry. He also hopes to do his share of good fishing.

We can not go into all the many achievements of a man such as Professor Lindsay, for it would take many more pages. For a life such as his, spent in dedication and service to students and friends, we say thank you. The staff of the Bobbin and Beaker and the faculty and students of the School of Industrial Management and Textile Science wish you, Professor Lindsay, the best of luck and the best of fishing.

Seated: Ken Stovall, vice-president; Jim Jensen, treasurer. Standing: Henry Milam, president; James Smith, recording secretary; Lock Hyatt, corresponding secretary.

The Industrial Management Society

By

Jim Jensen, I.M. '66

The Industrial Management Society has again enjoyed another year full of informative and technical information furnished by the range of guest speakers who have spoken to us this year. We have been fortunate to have such men as Mr. Holloway, Personnel Director of Singer Mfg. Company; Dr. Hugh Macaulay, Jr., Dean of the Graduate School; and Mr. Davis, Personnel Manager of Duke Power to head up these informative sessions.

The Club has taken several field trips this year visiting the Tru-Temper Corporation, Singer Mfg. Company, and perhaps the highlights of the year, the annual trip to Atlanta visiting the Federal Reserve Bank followed by lunch at the bank and then a tour of Carling's Brewery in the afternoon.

Each year the members of I.M.S. hold an informal banquet which provides the main social activity for the year. This year the banquet was held at Bolton's and it was an immediate success from the social hour to the steak dinner which followed. A banquet of this nature is planned for the first part of the coming semester giving the old and new members a chance to get acquainted.

Newly elected officers for the coming year are Millon Plyler, President; James Smith, Vice-President; Jim Jensen, Secretary; Bobby Partridge, Treasurer; and Butch Moss, Historian.

Any person who is interested in management and would like to gain an insight in how management functions in all industries on a daily basis is cordially invited to attend the meetings which are held on the first and third Tuesday of every month at 7:30 P.M.

S A M Hi-Lights

By
James Smith, I.M. '65

Left to right: Bobby Partridge, treasurer; Jim Jensen, secretary; James Smith, vice-president; Millon Plyler, president.

The Clemson Chapter of the Society for the Advancement of Management is one of over 211 student chapters of this national professional organization of managers in industry, commerce, government, and education. The immediate objectives of S.A.M. are "to bring together executives in business and students preparing to go into business; to serve as an effective medium for the exchange and distribution of information on the problems, policies, and methods of management and industry; and to provide students with the opportunity to participate in the organizing, planning, directing and controlling of the activities of an organization dedicated to the promotion and advancement of the art and science of management."

S.A.M. strives to accomplish its objectives through interesting and informative programs, enjoyable social activities such as its annual banquet, trips to local commercial and industrial establishments, and by giving every member an opportunity to further his personal development through active participation in the functions of the club. Any person who desires to contribute his time and efforts can certainly find a place to do so in S.A.M.

One function of S.A.M. that we feel is a direct contribution to the entire student body at Clemson is our annual Career Day Program. The Program consists of bringing in representatives of about twenty employment areas with which Clemson graduates might find good opportunities to pursue their life's work to talk with any student interested in that special field. This program can definitely be of value to any student who participates.

Through trips to the various firms in this area members gain an understanding of the operation of the firms and have a chance to meet and talk to business leaders in the area. Some of the trips S.A.M. has taken in the past were tours of the Jantzen facilities in Seneca, the Dunlop Plant in Westminster, the Buick-Oldsmobile-Pontiac Division of General Motors Corporation in Doraville, Georgia, and the True Temper Corporation in Anderson.

In April of this year S.A.M. took a trip to Atlanta as guests of the Federal Reserve Bank and Carlings Brewery.

Through our bi-monthly programs S.A.M. members are given opportunity to hear the views of and to meet many top business people. Some of the outstanding past speakers were: Mr. Charlie Johnson, Personnel Director of Judson Mills, Deering Milliken Company; Professor Harold Fischer, President of the University Division of the Society for the Advancement of Management; Mr. James Hoyt, President of Greenville Senior Chapter of S.A.M.; Mr. E. J. Kehrer of the Ladies Garment Workers Union and Mr. James F. Gallivan, a stock and securities broker from Greenville.

S.A.M. has recently selected officers for the coming year. These are President, Henry Milam; Vice President, Ken Stovall; Corresponding Secretary, Lock Hyatt; Recording Secretary, James Smith; and Treasurer, Jim Jensen. The goal of these officers is to make the Clemson Chapter of S.A.M. one of the top student chapters in the nation through a large active membership and good planning.

One of the possible future activities of S.A.M. is the publication of a News Letter. One can easily see the opportunity for valuable experience for members interested in this publication.

It has been the purpose of this article to tell you what S.A.M. is, what it does, and why you should join it. See you at the meetings on the second and fourth Tuesday nights of each month at 7:30 in Sirrine Auditorium.

Left to right: Bruce Edwards, vice-president; Charles Miller, president; Mac Harley, secretary; Glenn Link, treasurer.

Left to right: Michael R. Prater, Mr. Joseph Lindsay, Mr. John Thompson.

A Year With A. A. T. C. C.

By
Mac Harley, T.C. '67

For the student chapter of the American Association of Textile Chemists and Colorists of Clemson University, the school year of 1963-64 has brought much progress. A rather informal club exclusively for Textile Chemistry majors, the A.A.T.C.C. made several notable advances this past year. A new sign was constructed to inform members of meeting times. A group picture was made for **Taps** for the first time. Refreshments were furnished at many of the meetings.

One of the chief functions of A.A.T.C.C. is to take textile chemistry majors to various mills and finishing plants in the area around Clemson. This past year the club went to Utica-Mohawk on Lake Hartwell; Magnolia Finishing Plant, a Pacolet Industries plant in Blacksburg, S. C.; and Cranston Printworks in Fletcher, N. C. These trips were very beneficial to club members and added a great deal to the school year.

On November 26, 1963, the A.A.T.C.C. held its annual fall banquet. Speaker for this occasion was Mr. Chester Culver, of Clemson, who is with the Goodrich Chemical Corporation. The annual spring banquet is set for May 7, 1964.

Officers for this past year were as follows: president— Randy Prater from Seneca; vice-president—Bill Hawfield, Lancaster, who was succeeded by Jack Neeley, Spartanburg, at mid-term; secretary—Charles Funderburke, Rock Hill; and treasurer—Robert Fulmer, Leesville. Officers elected for the 1964-65 school year are Charles Miller, president, from York; Bruce Edwards, vice-president, from Tryon, N. C.; Mac Harley, secretary, from Barnwell; and Glenn Link, treasurer, from Cherryville, N. C. The new officers are to be installed at the spring banquet.

On Thursday, May 7, the A.A.T.C.C. held its annual spring banquet. This was a special gathering in that Mr. Joseph Lindsay, retiring head of the Textile Chemistry and Dyeing Departments, was honored. The A.A.T.C.C. presented him with an engraved silver revere bowl and established an awad in his name. This prize, the Mr. Joseph Lindsay Award, is to consist of the inscription of the name of the most outstanding graduating senior in textile chemistry beginning with the school year 1964-65.

The banquet speaker was Mr. John Thompson, who lives in Clemson and is the area representative for BASF Chemical Corporation of Charlotte. He spoke on the dyeing of polyester blends, chiefly dacron and cotton. He spoke of BASF's Thermosol process of dyeing. The last topic he dwelled upon was the dyeing of poly-propylene fibers with dyestuffs from BASF.

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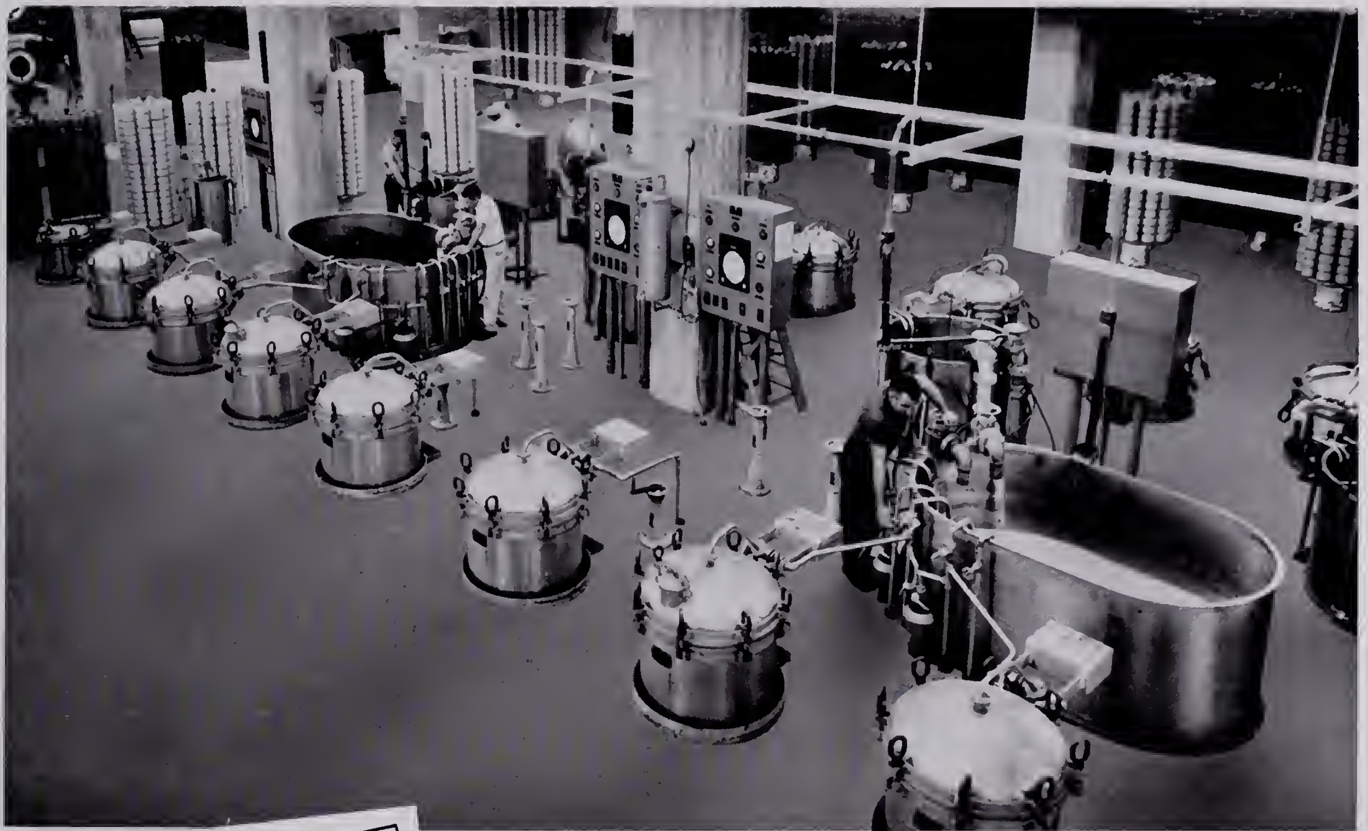

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